ASMIRT

The Australian Society of Medical Imaging and Radiation Therapy

Your practice. Your profession. Your future.

ASMIRT PGMI DATASET 2023

ASMIRT Acknowledges the Breast Imaging Reference Group for the updates to this dataset.

Origin of PGMI

- Evaluation of Clinical Image Quality
- Quality mammography requires dedication, enthusiasm and self-appraisal on the part of the Radiographer.
- The United Kingdom Mammography Trainers' Group, with the support of the College of Radiographers, devised the PGMI (Perfect, Good, Moderate, Inadequate) method of evaluation of clinical image quality.
- Ongoing evaluation critically looks at each mammographic examination within a quality improvement framework.

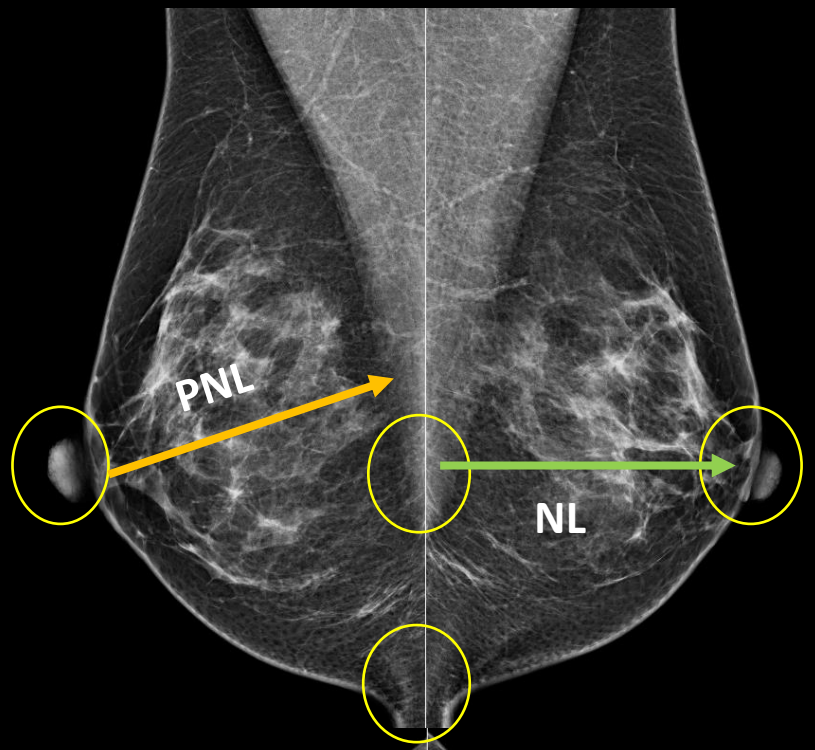
PGMI Digital Image
Reference Set
Version October 2017. ASMIRT Medical Imaging Advisory Panel (MIAP 2)

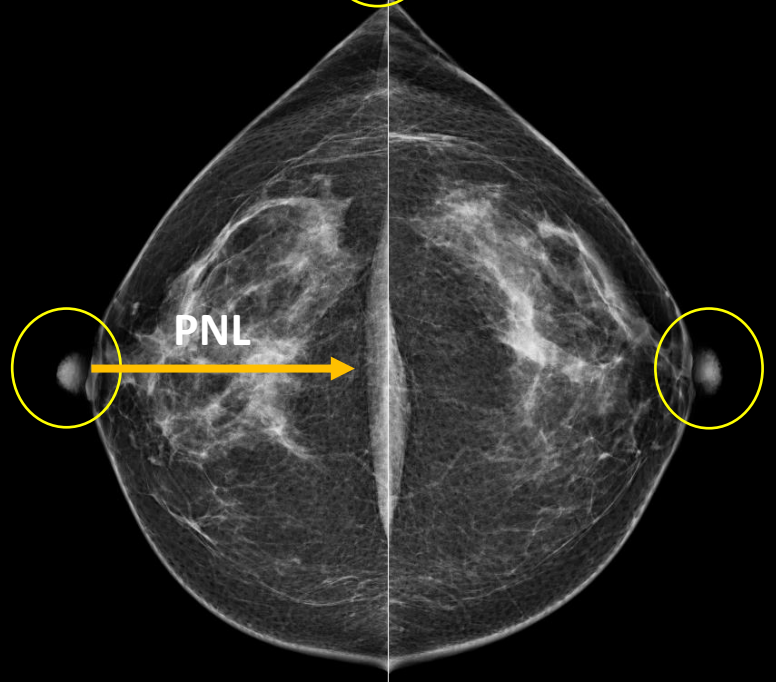
PERFECT

1. All breast tissue imaged (fat visualised posterior to glandular tissue).
2. Correct image identification clearly shown:
   - Date of examination
   - Client identification – name and (number and/or date of birth)
   - Side markers
   - Positional markers
   - Radiographer identification
3. Correct exposure for modality.
4. Good compression.
5. Absence of movement.
6. Correct image processing.
7. Absence of artefacts.
8. No skin folds.
9. Symmetrical images.

P = PERFECT IMAGES

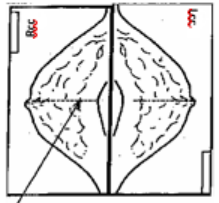
Both CC and MLO images meet criteria for image assessment 1 – 9.





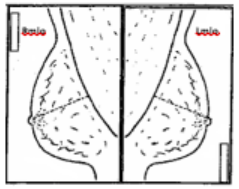
CRITERIA FOR DIGITAL IMAGE ASSESSMENT

1. All breast tissue imaged (fat visualised posterior to glandular tissue).
2. Correct image identification clearly shown:
   - Date of examination
   - Client identification – name and (number and/or date of birth)
   - Side markers
   - Positional markers
   - Radiographer identification
3. Correct exposure for modality.
4. Good compression.
5. Absence of movement.
6. Correct image processing.
7. Absence of artefacts.
8. No skin folds.
9. Symmetrical images.



Cranio-caudal view (CC)
Specific positioning criteria

1. All breast tissue imaged.
   - Medial border well demonstrated.
   - Nipple in profile or skin edge seen transecting nipple (retro-areolar tissue well separated).
   - Nipple in midline of imaged breast.
   - Posterior nipple line (PNL) within 1cm of PNL on MLO view.



Medio-lateral oblique view (MLO)
Specific positioning criteria

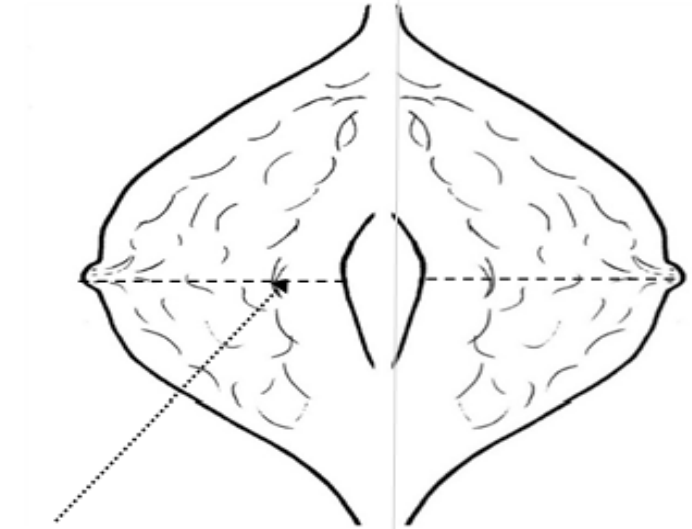
1. All breast tissue imaged.
   - Pectoral muscle shadow to nipple level.
   - Full width of pectoral muscle.
   - Nipple in profile or skin edge seen transecting nipple (retro-areolar tissue well separated).
   - Infra-mammary fold well demonstrated.
   - PNL within 1cm of PNL on CC view.

P-PERFECT

Key areas checked when assessing images

CLASSIFICATION OF CC IMAGES	CLASSIFICATION OF MLO IMAGES
P = PERFECT IMAGES Both CC and MLO images meet criteria for image assessment 1 – 9.	
G = GOOD IMAGES 1. All breast tissue imaged*. • All posteromedial tissue visualised (*axillary portion of breast not to be included at expense of medial portion). • Nipple in profile or skin edge seen transecting nipple. • Nipple in midline of imaged breast.	**G = GOOD IMAGES** 1. All breast tissue imaged. • Pectoral muscle well demonstrated. • Nipple in profile or skin edge seen transecting nipple. • Infra-mammary fold (IMF) well demonstrated.
2 – 6. Both CC and MLO images meet criteria for image assessment 2 – 6 inclusive for categorisation as **G**. 7 – 9. Both CC and MLO images displaying minor degrees of variation in criteria for imaging assessment 7, 8 and 9 will be accepted for categorisation as **G**. Minor artefacts not impacting on tissue visualise Minor skin folds –tissue visualisation seen through the minor creases/folds Minor asymmetry	
M = MODERATE IMAGES (acceptable for diagnostic purposes) 1. Most breast tissue imaged *(however, all breast tissue must be imaged on MLO image).* • Nipple not in profile but clearly distinguishable from retro-areolar tissue *(however, nipple must be in profile on MLO image).* • Nipple not in midline *(significant bias).*	**M = MODERATE IMAGES** (acceptable for diagnostic purposes) 1. Most breast tissue imaged. • Pectoral muscle not to nipple level but posterior breast tissue adequately shown. • Nipple not in profile but clearly distinguishable from retro-areolar tissue *(however, nipple must be in profile on CC image).* • IMF not clearly demonstrated but breast tissue adequately shown.
2. Correct(ed) image identification. 3. Correct exposure for modality. 4. Adequate compression. 5. Absence of movement. 6. Correct image processing. 7. Artefacts which do not obscure the image. 8. Skin folds which do not obscure the breast tissue. 9. Asymmetrical images.	
I = INADEQUATE IMAGES (applies to both CC and MLO images) 1. Significant part of the breast not imaged. 2. Incomplete or incorrect identification. 3. Incorrect exposure. 4. Inadequate compression which hinders diagnosis. 5. Blurred image. 6. Incorrect image processing. 7. Overlying artefacts. 8. Skin folds which obscure the image.	

PERFECT

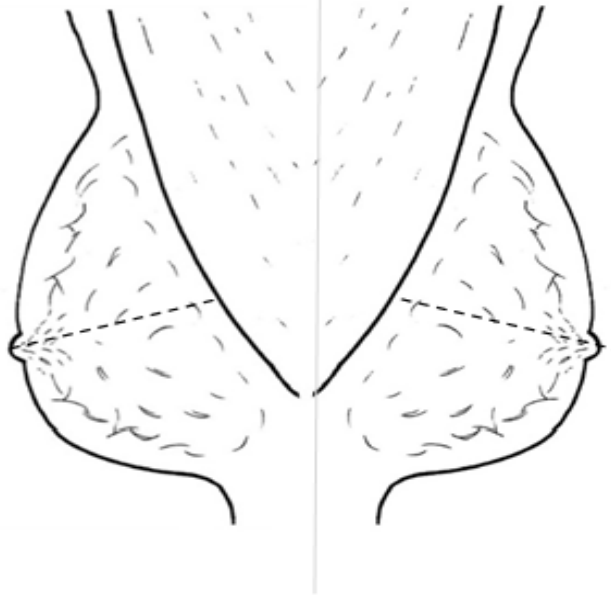


PNL posterior nipple line

Cranio-caudal view (CC)
Specific positioning criteria

1. All breast tissue imaged
   - medial border well demonstrated
   - nipple in profile or skin edge seen transecting nipple (retro-areolar tissue well separated)
   - nipple in midline of imaged breast
   - posterior nipple line (PNL) within 1cm of PNL on MLO view)

Classification of CC images



Medio-lateral oblique view (MLO)
Specific positioning criteria

1. All breast tissue imaged
   - pectoral muscle shadow to nipple level
   - full width of pectoral muscle
   - nipple in profile or skin edge seen transecting nipple (retro-areolar tissue well separated)
   - infra-mammary angle well demonstrated
   - PNL within 1cm of PNL on CC view

Classification of MLO images

P = Perfect images

Both CC and MLO images meet criteria for image assessment 1–9

P-PERFECT

All breast tissue imaged

Medial border well demonstrated

Nipple in profile

Nipple in midline of imaged breast

Posterior nipple line (PNL) within 1 cm of PNL on MLO view

Both images meet PGMI criteria 1-9

P-PERFECT

All breast tissue imaged

Pectoral muscle shadow to nipple level

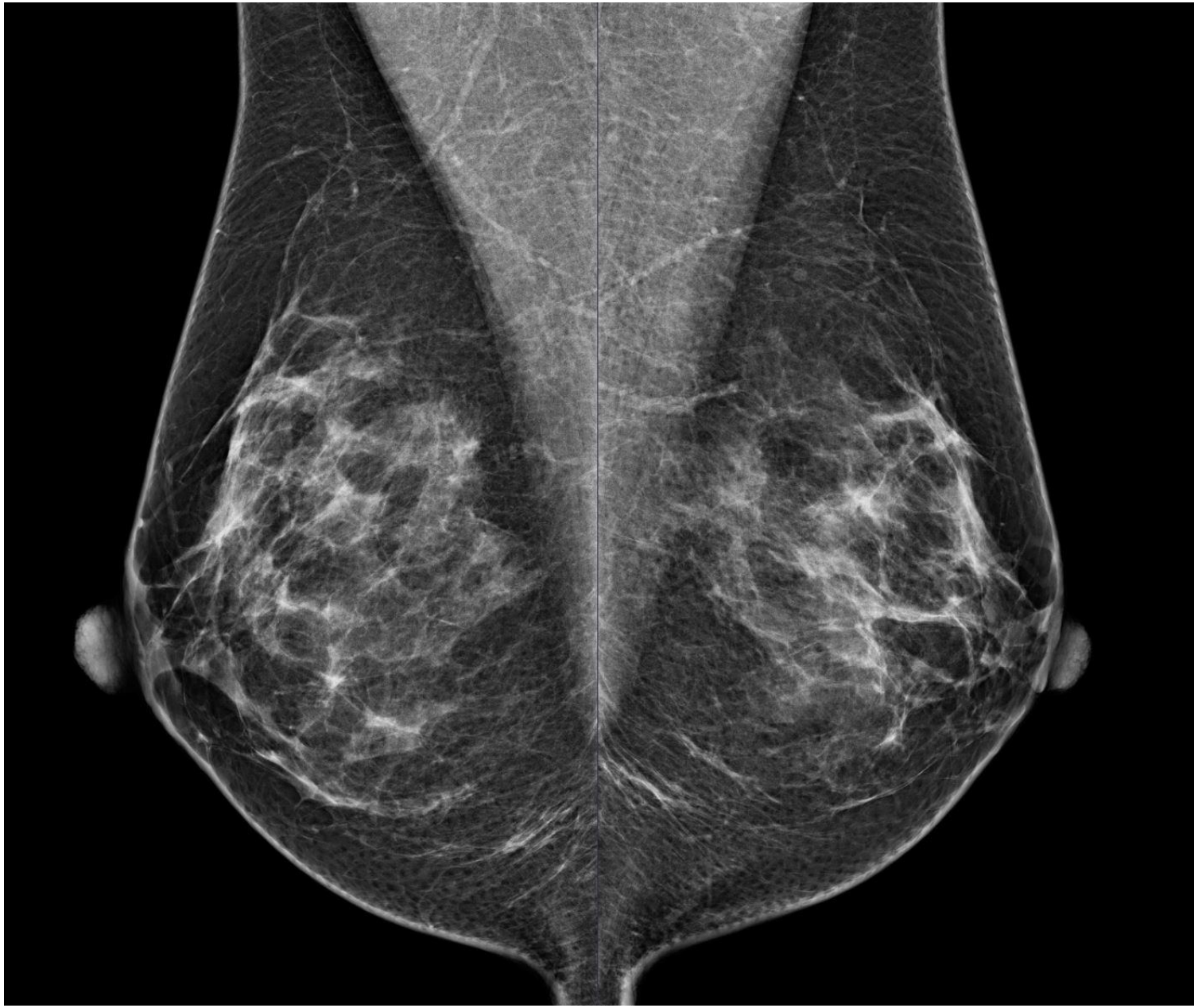
Full width of pectoral muscle

Nipple in profile

Inframammary fold well demonstrated

PNL within 1cm of PNL on CC view

Both images meet PGMI criteria 1-9



P-PERFECT

All breast tissue imaged

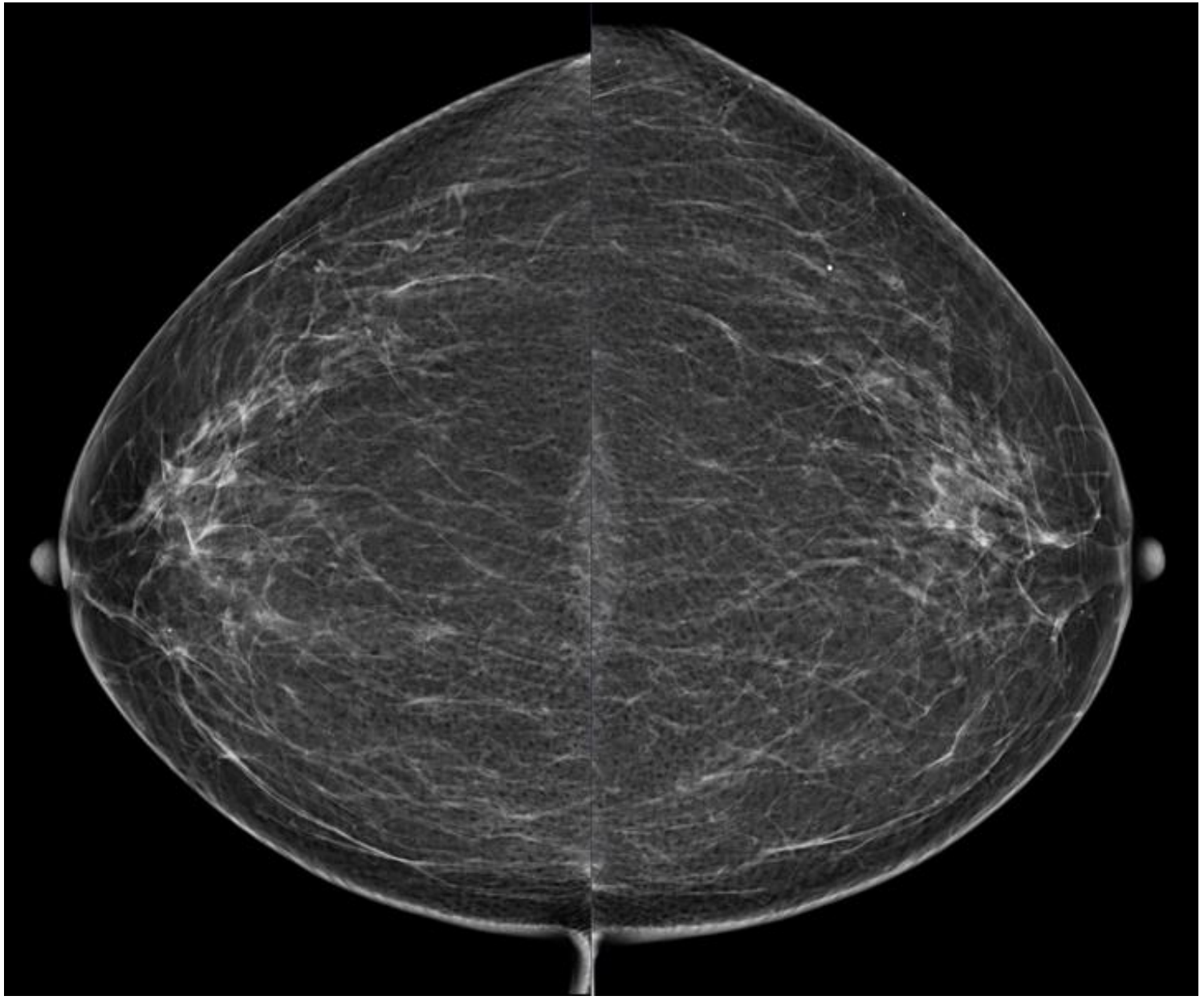
Medial border well demonstrated

Nipple in profile

Nipple in midline of imaged breast

Posterior nipple line (PNL) within 1 cm of PNL on MLO view

Both images meet PGMI criteria 1-9



P-PERFECT

All breast tissue imaged

Pectoral muscle shadow to nipple level

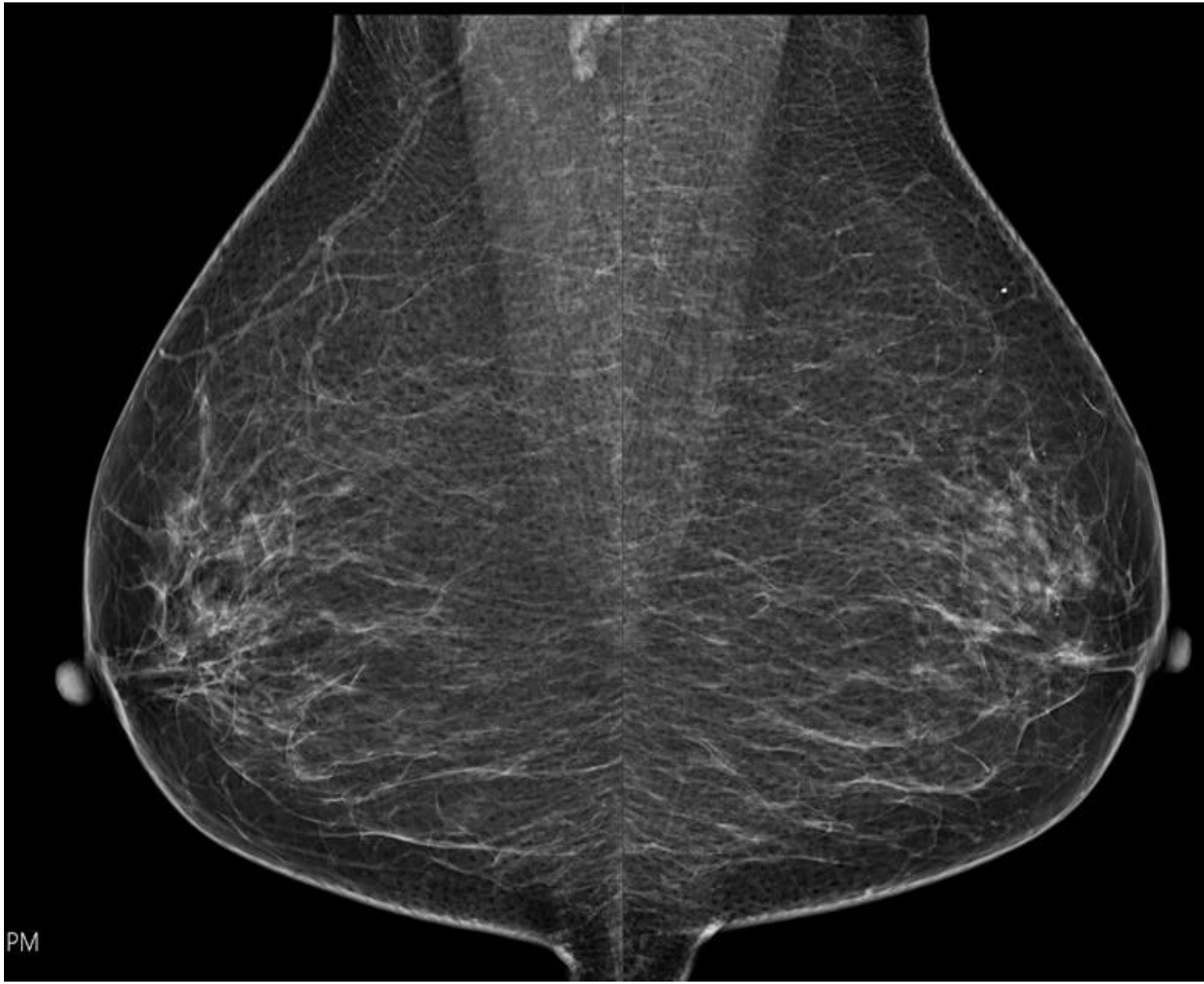
Full width of pectoral muscle

Nipple in profile or skin edge seen transecting nipple

Inframammary fold well demonstrated

PNL within 1cm of PNL on CC view

Both images meet PGMI criteria 1-9



GOOD

G = GOOD IMAGES 1. All breast tissue imaged*. • All posteromedial tissue visualised (*axillary portion of breast not to be included at expense of medial portion). • Nipple in profile or skin edge seen transecting nipple. • Nipple in midline of imaged breast.	**G = GOOD IMAGES** 1. All breast tissue imaged. • Pectoral muscle well demonstrated. • Nipple in profile or skin edge seen transecting nipple. • Infra-mammary fold (IMF) well demonstrated.
2 – 6. Both CC and MLO images meet criteria for image assessment 2 – 6 inclusive for categorisation as **G**. 7 – 9. Both CC and MLO images displaying minor degrees of variation in criteria for imaging assessment 7, 8 and 9 will be accepted for categorisation as **G**. Minor artefacts not impacting on tissue visualisation. Minor skin folds –tissue visualisation seen through the minor creases/folds. Minor asymmetry	

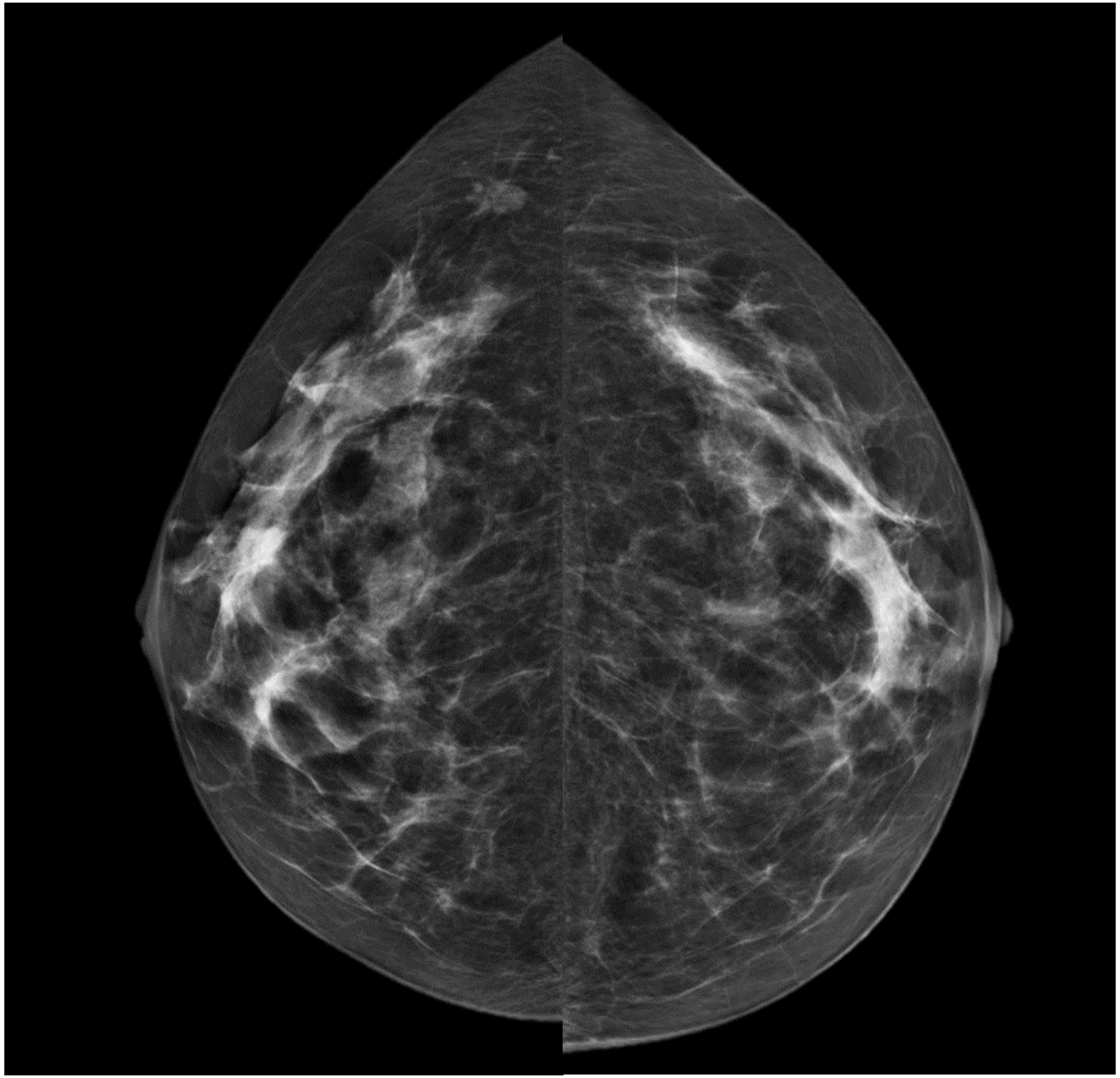
G- GOOD

All breast tissue imaged*

All postero-medial tissue visualised (*axillary portion of breast not to be included at expense of medial portion)

Nipple in profile or skin edge seen transecting nipple

Nipple in midline of imaged breast



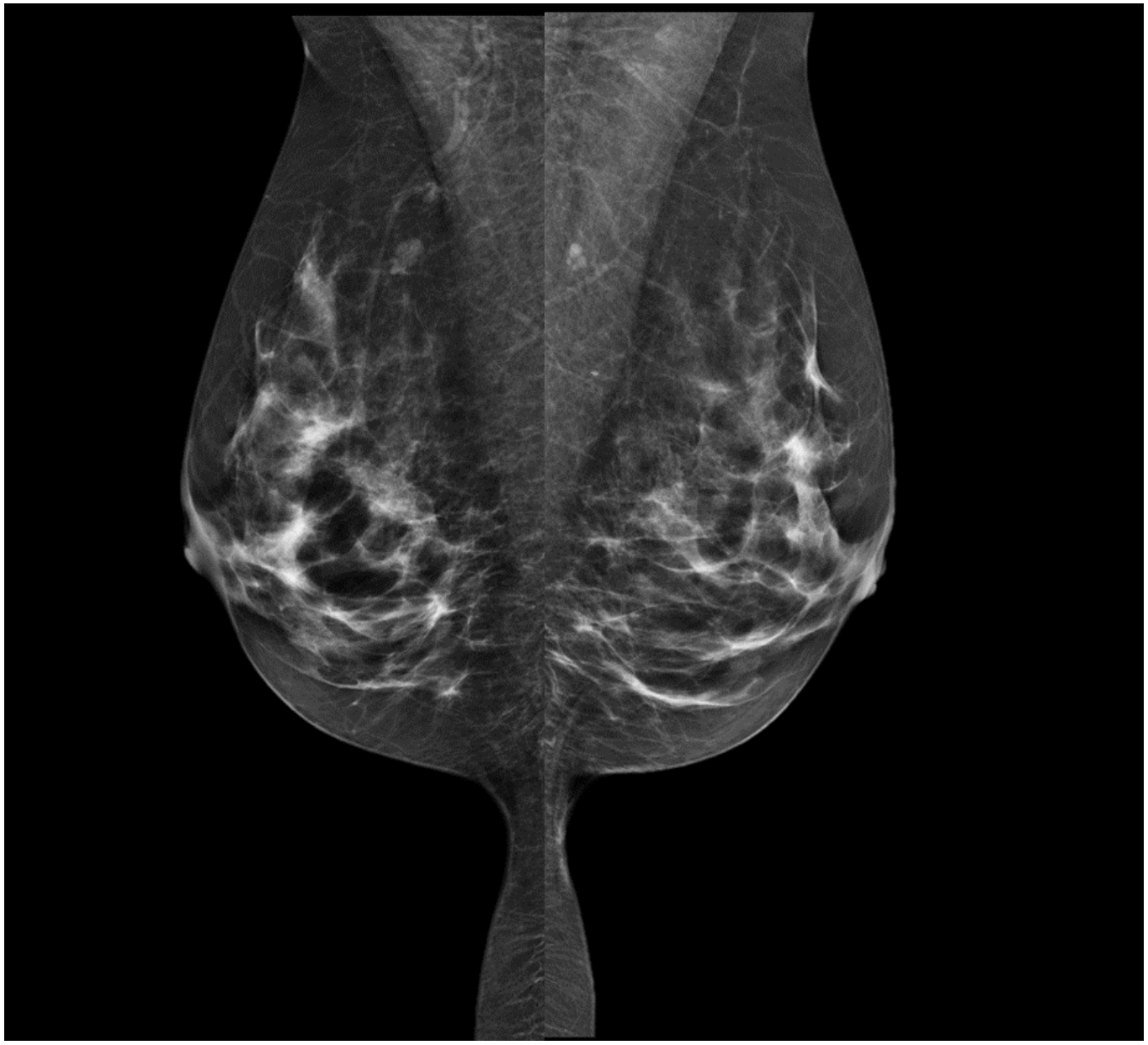
G-GOOD

All breast tissue imaged pectoral muscle well demonstrated

Nipple in profile or skin edge seen transecting nipple

Infra-mammary fold (IMF) well demonstrated

Case 3
Overall Study Grade G



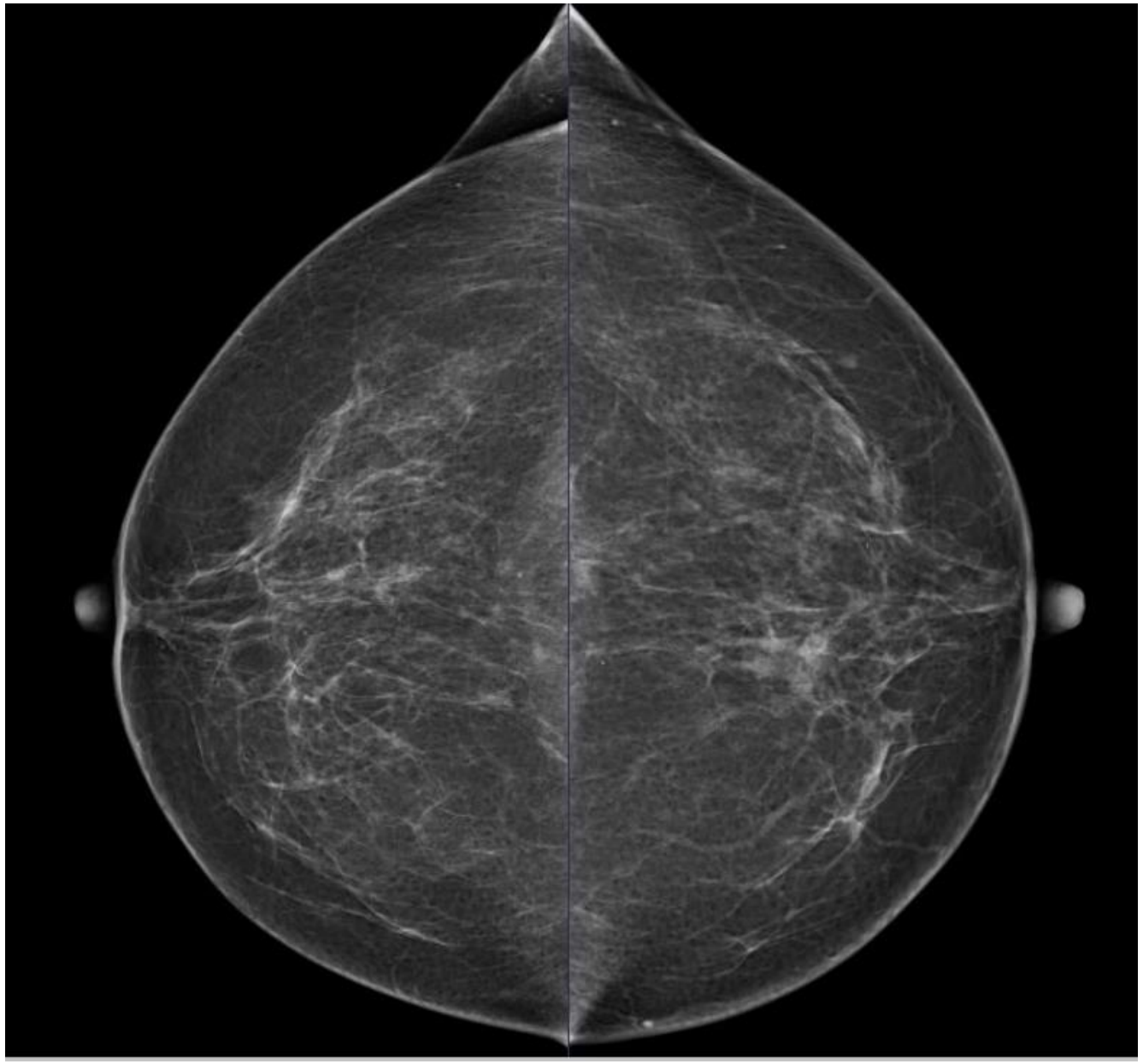
G- GOOD

All breast tissue imaged*

All postero-medial tissue visualised (*axillary portion of breast not to be included at expense of medial portion)

Nipple in profile

Nipple in midline of imaged breast



G-GOOD

All breast tissue imaged

Pectoral muscle well demonstrated

Pec length to nipple

Nipple in profile or skin edge seen transecting nipple

Infra-mammary fold (IMF) well demonstrated

Minor asymmetry seen

Minor creases/folds – IMA on left

Case 4
Overall Study grade G

G- GOOD

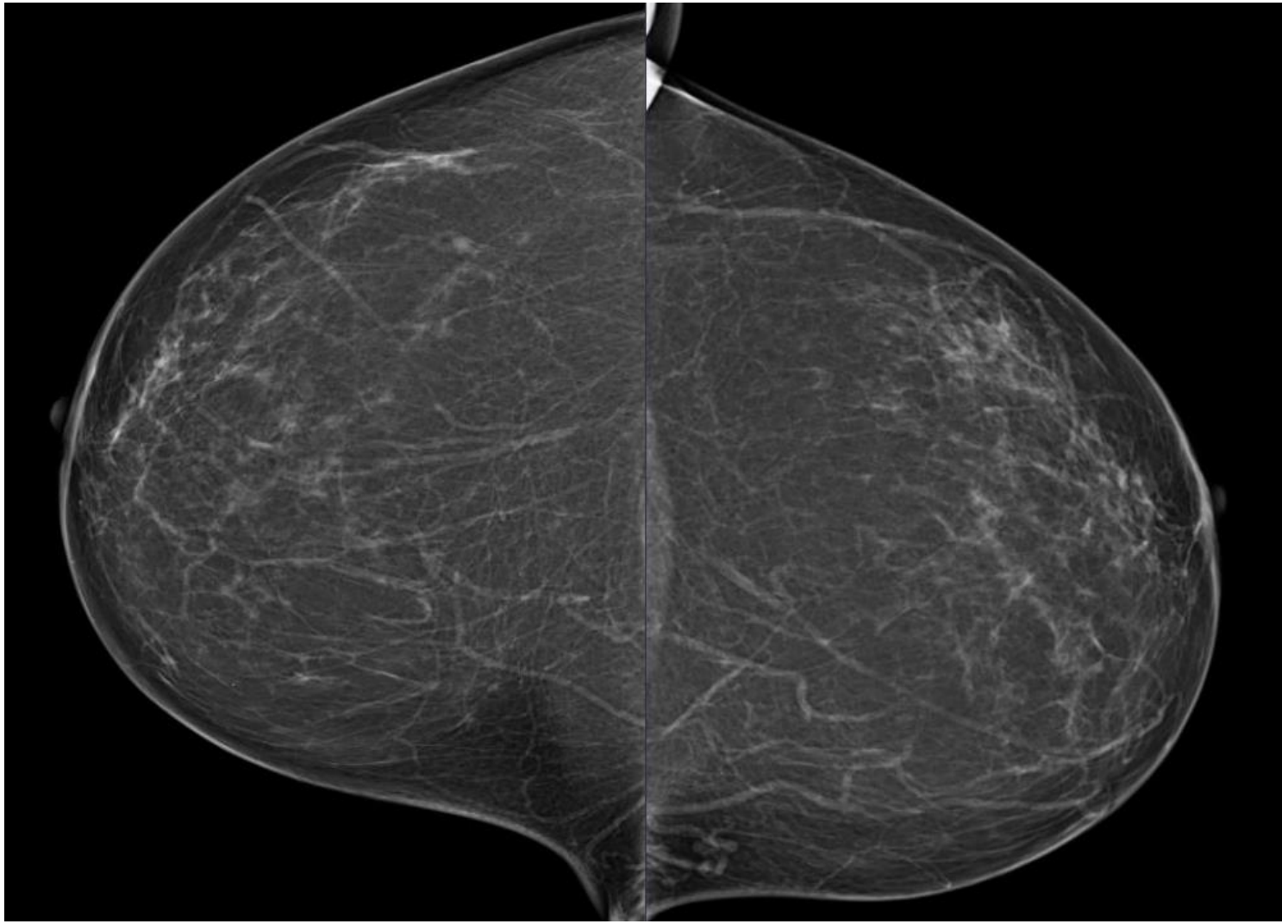
All breast tissue imaged*

All postero-medial tissue visualised
(*axillary portion of breast not to be included at expense of medial portion)

Nipple in profile

Nipple in midline of imaged breast

(LCC centrally placed with good inclusion of lateral aspect without bias tissue minor skin artefact lateral
RCC included with less lateral inclusion but pec just seen)



G-GOOD

All breast tissue imaged pectoral muscle well demonstrated

Nipple in profile or skin edge seen transecting nipple

Infra-mammary fold (IMF) well demonstrated
(slight twist LIMF)

Case 5
Overall Study grade G

G- GOOD

All breast tissue imaged*

All postero-medial tissue visualised

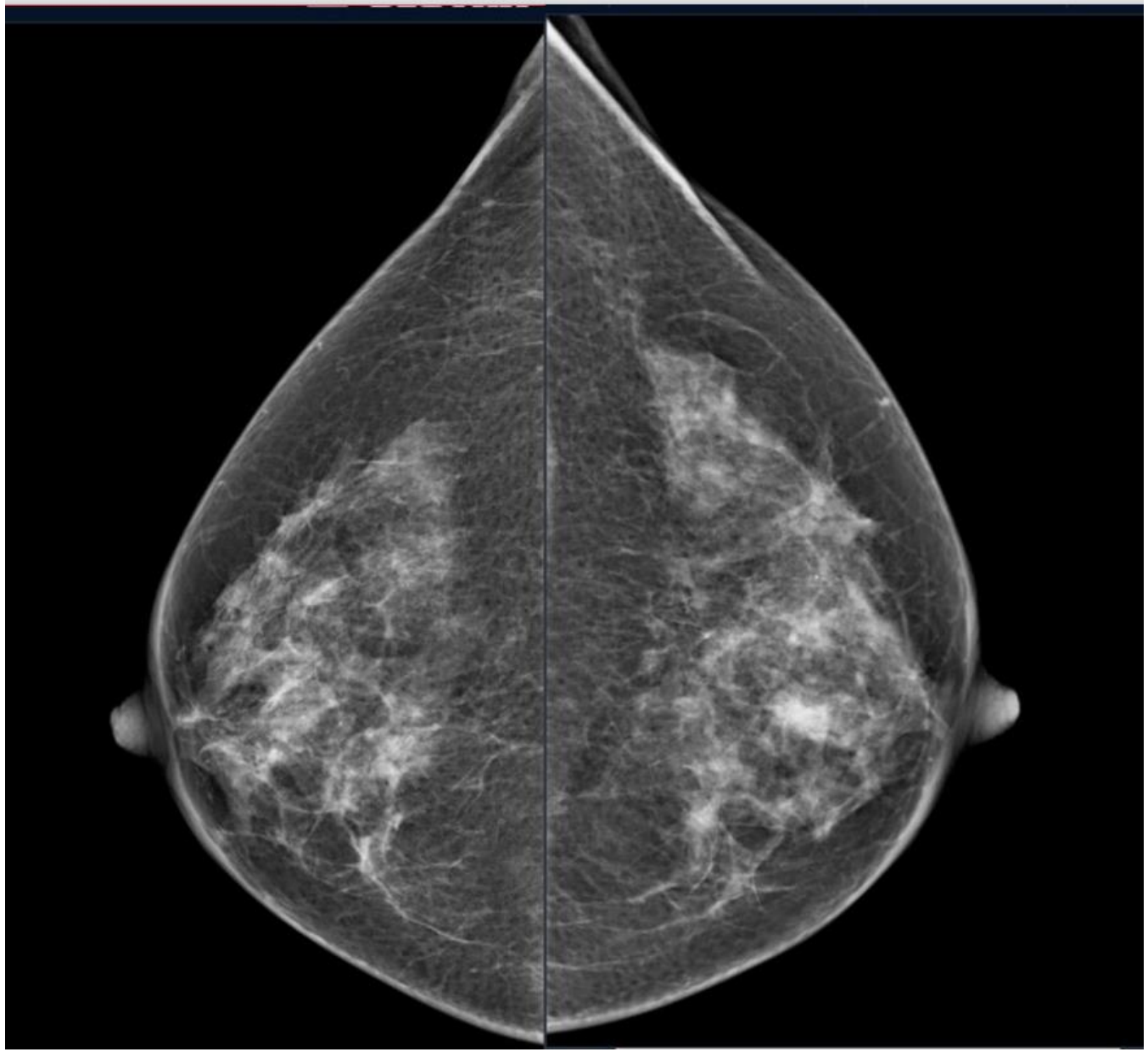
(*axillary portion of breast not to be included at expense of medial portion)

Nipple in profile

Nipple in midline of imaged breast

(nipple not in midline but forward facing ,retromammary aspect shown and no tissue loss)

Crease/fold at lateral LCC aspect



P-PERFECT

All breast tissue imaged

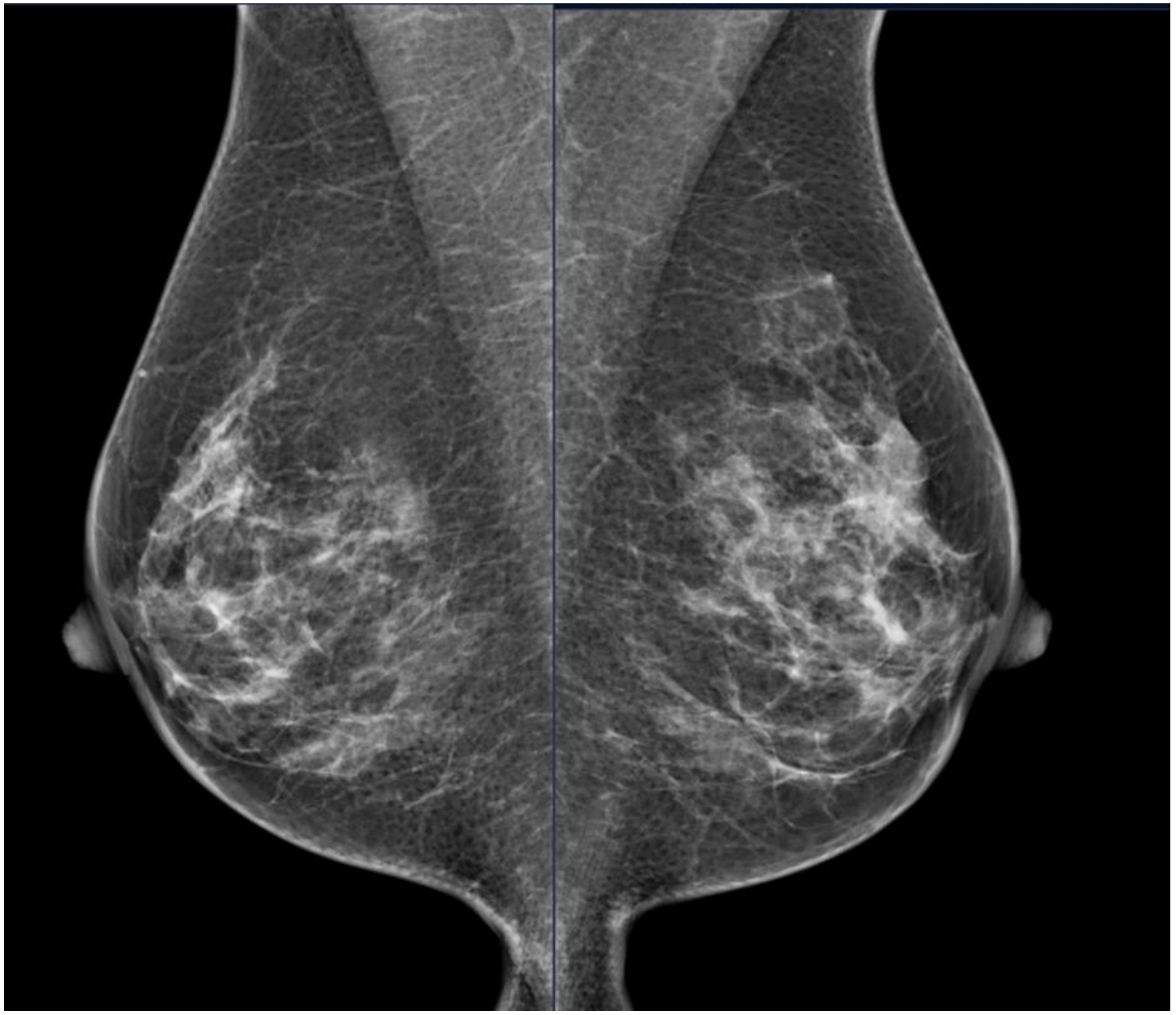
Pectoral muscle well demonstrated

Pec length to nipple

Nipple in profile or skin edge seen transecting nipple

Infra-mammary fold (IMF) well demonstrated

Case 6
Overall Study grade is G due to CC grading



MODERATE

Moderate images on CC

Moderate images on MLO

M = MODERATE IMAGES (Acceptable for diagnostic purposes) 1. Most breast tissue imaged *(however, all breast tissue must be imaged on MLO image).* ➢ Nipple not in profile, but clearly distinguishable from retro-areolar tissue *(however, nipple must be in profile on MLO image)* ➢ Nipple not in midline *(significant bias)*	**M = MODERATE IMAGES** (Acceptable for diagnostic purposes) 1. Most breast tissue imaged. ➢ Pectoral muscle not to nipple level but posterior breast tissue adequately shown. ➢ Nipple not in profile, but clearly distinguishable from retro-areolar tissue *(however, nipple must be in profile on CC image).* ➢ IMF not clearly demonstrate but breast tissue adequately shown.

2. Correct (ed) image identification.
3. Correct exposure for modality.
4. Adequate compression.
5. Absence of movement.
6. Correct image processing.
7. Artefacts which do not obscure the image.
8. Skin folds which do not obscure the breast tissue.
9. Asymmetrical images.

Nipple not in profile but clearly distinguishable from retro-areolar tissue

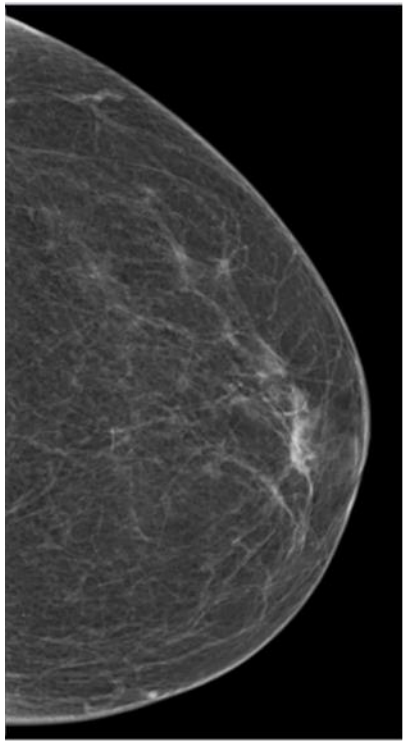
M grading

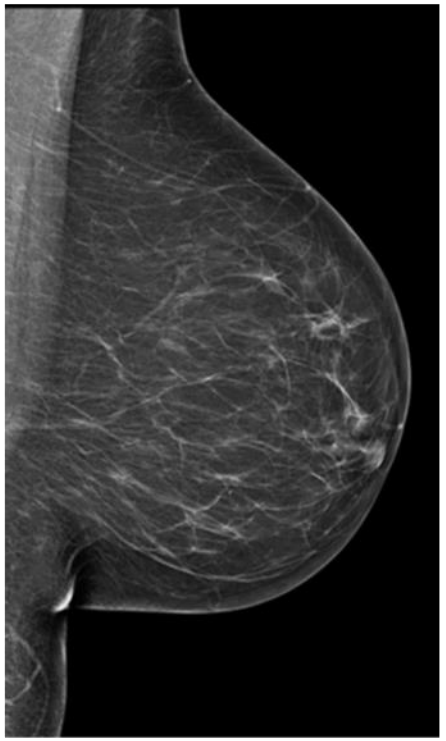
(if rest of criteria met and in profile on 2nd view)

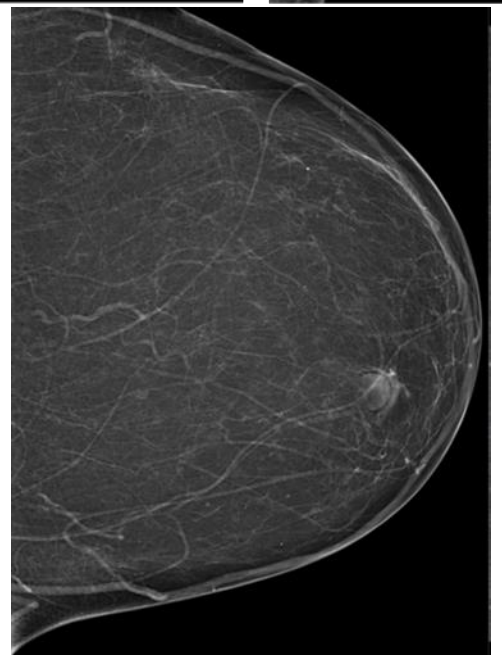
- extra nipple in profile view considered depending on local clinical protocols, are both views required in profile

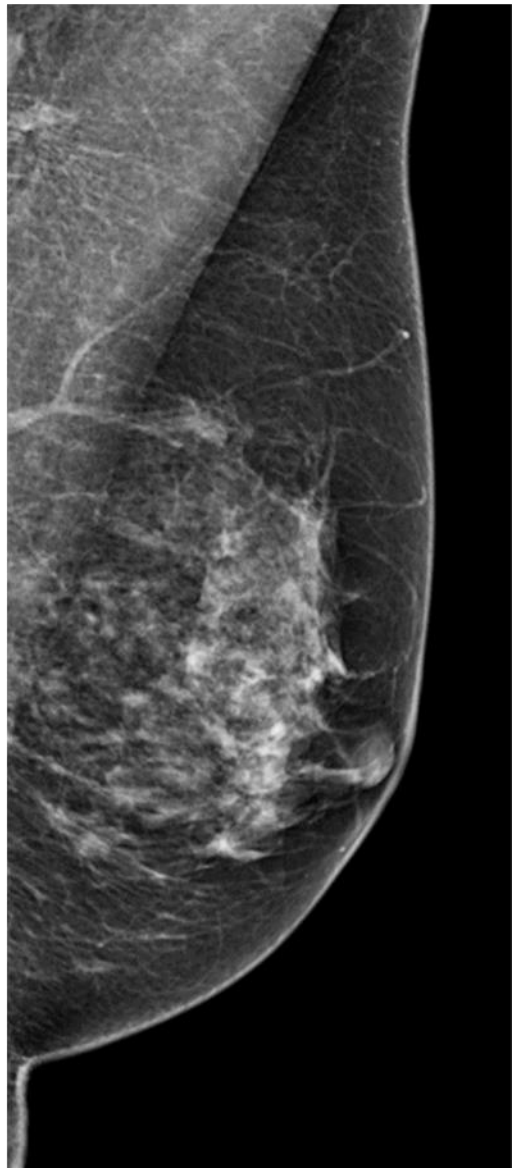
OR

- if R1 screening client should have extra nipple in profile views as baseline







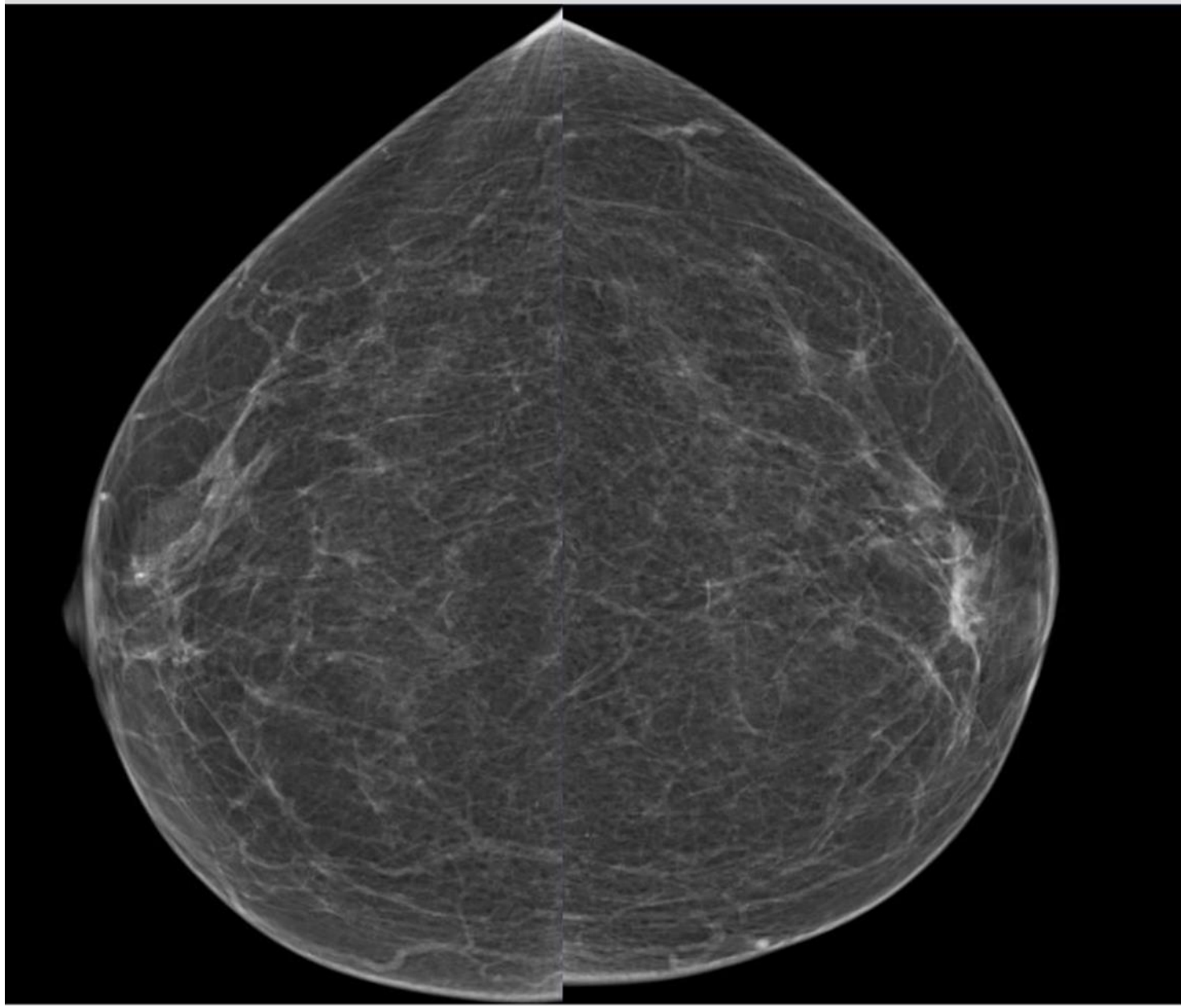


M – MODERATE

Most breast tissue imaged

Nipple not in profile on LCC but clearly distinguishable from retro-areolar tissue

Nipple in midline



M – MODERATE

Most breast tissue imaged.

Pectoral muscle not to nipple level but posterior breast tissue adequately shown.

Nipple in profile or transecting

IMF not clearly demonstrated on RMLO but breast tissue adequately shown.

Case 7

Overall study grade M

G- GOOD

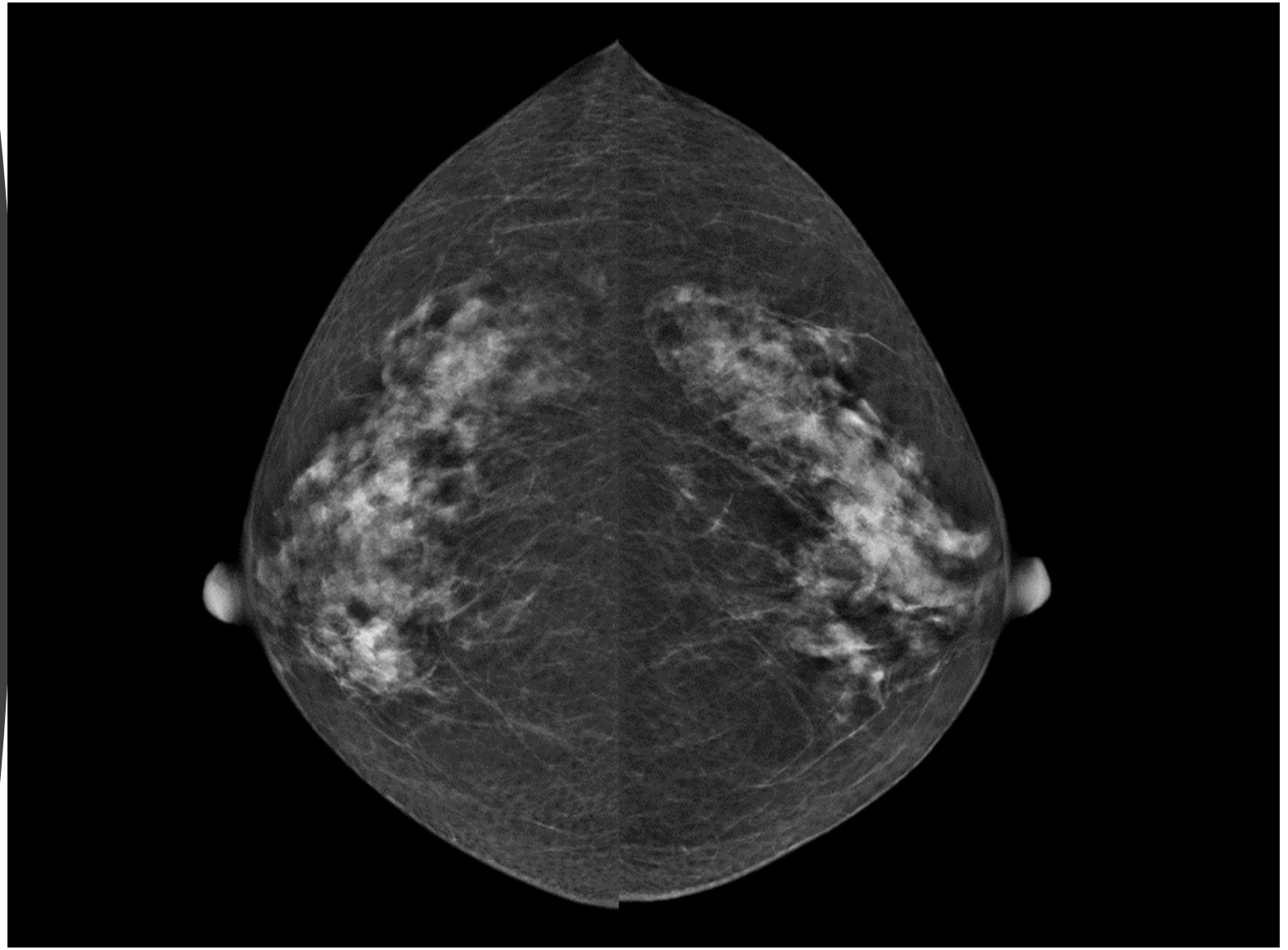
All breast tissue imaged*

All postero-medial tissue visualised (*axillary portion of breast not to be included at expense of medial portion)

Nipple in profile

Nipple in midline of imaged breast

(nipple not in midline but forward facing ,retromammary aspect shown and no tissue loss)



M – MODERATE

All breast tissue imaged.

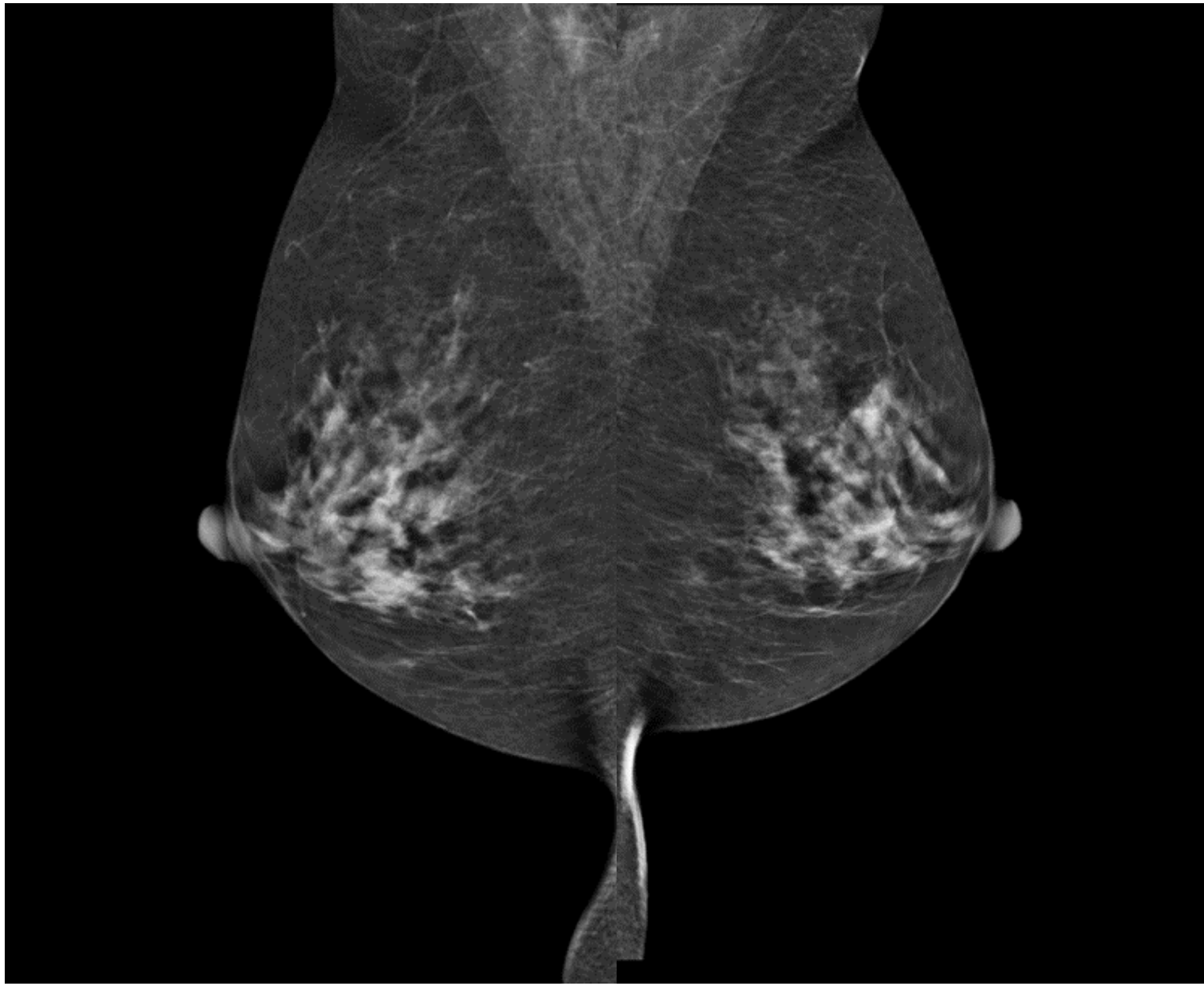
Pectoral muscle not to nipple level but posterior breast tissue adequately shown.

Nipple in profile

IMF not clearly demonstrated on LMLO but breast tissue adequately shown.

Case 8

Overall study grade M grading



M – MODERATE

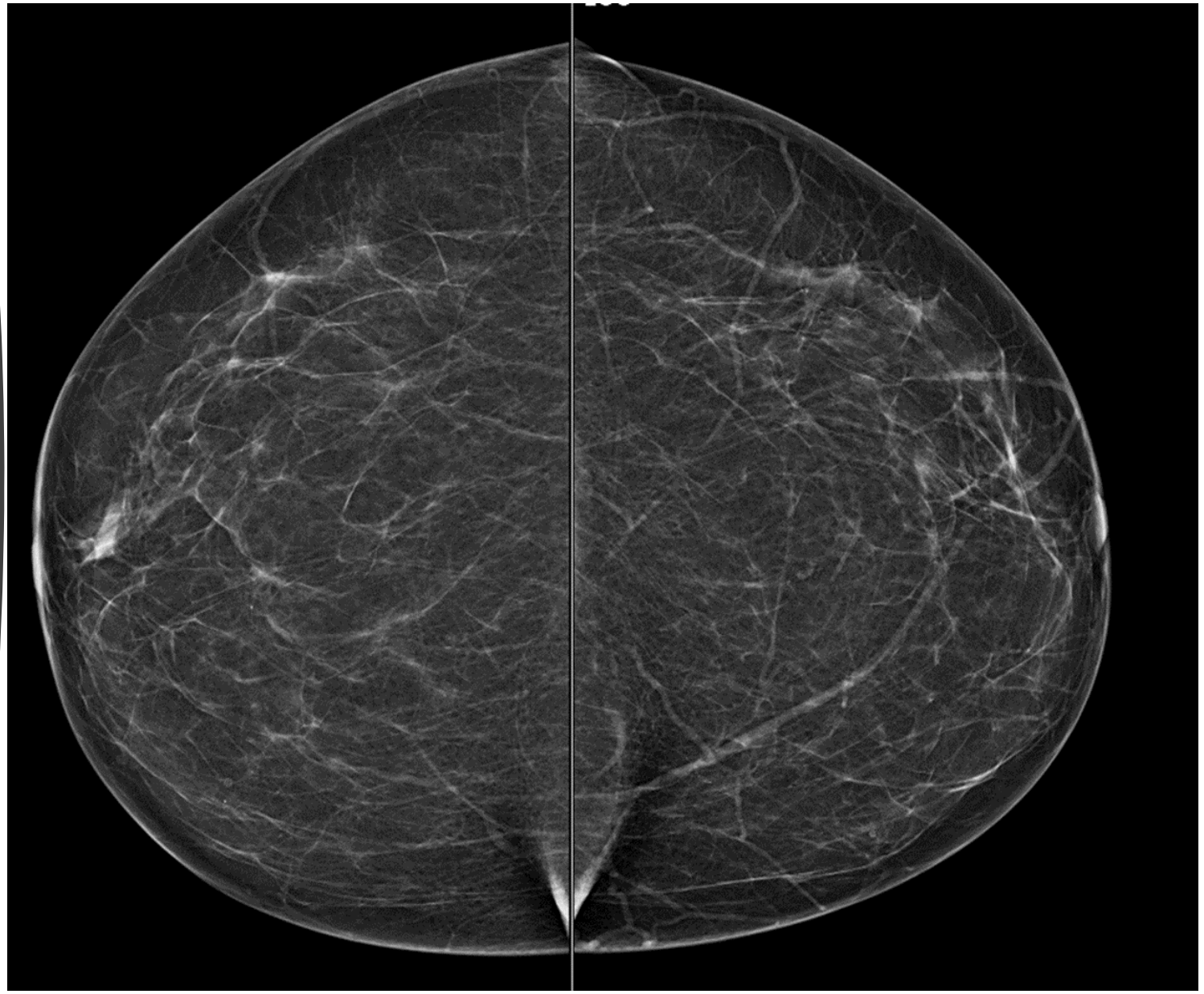
All breast tissue imaged, all postero-medial

tissue visualized

Nipple not in profile but transected on both CC s

Nipple in midline

Creases /folds medially on CCs



M – MODERATE

All breast tissue imaged.

Pectoral muscle to nipple level.

Nipple not in profile on R MLO

IMF not clearly visualized but area demonstrated adequately through minor folds/creases.

Case 9

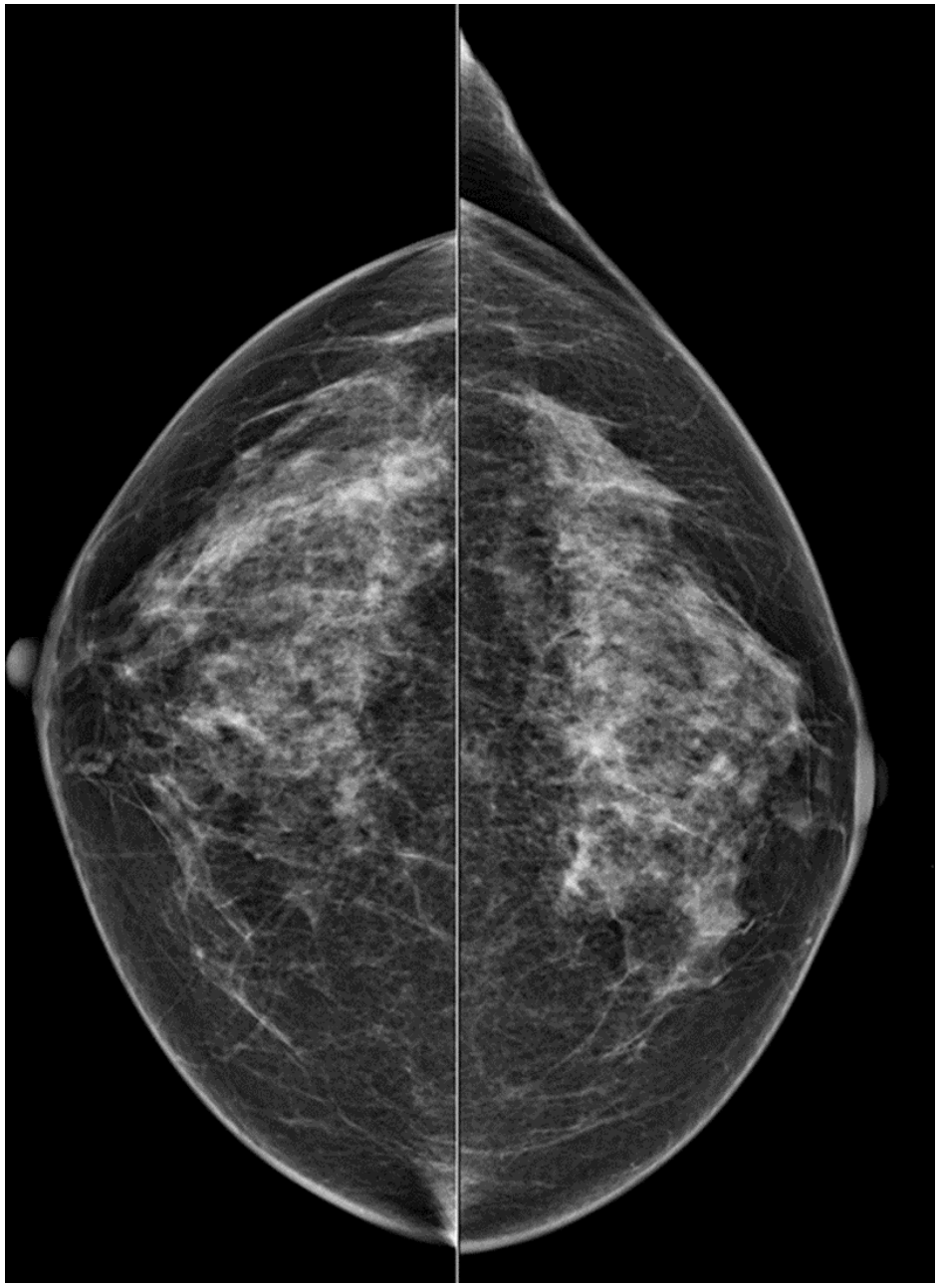
Overall study grade M

M – MODERATE

All breast tissue imaged, all postero-medial tissue visualized

Nipple transected on L

Nipple in midline L and some slight bias on R with some loss of tissue



M – MODERATE

Most breast tissue imaged.

Pectoral muscle to nipple level.

Nipple not in profile on L MLO but clearly distinguishable from retro-areolar tissue

IMF clearly demonstrated

Case 10

Overall study grade M

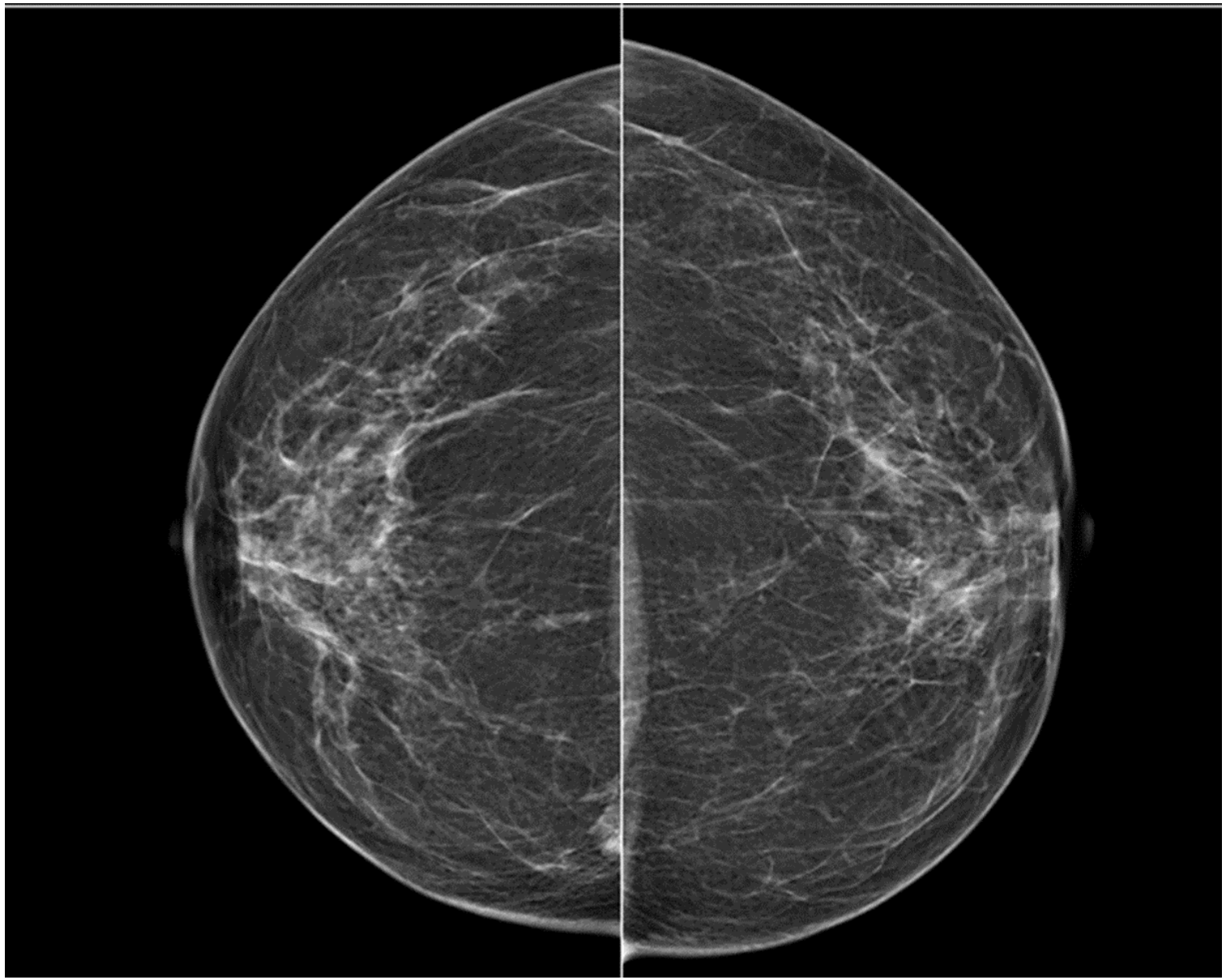
G- GOOD

All breast tissue imaged*

All postero-medial tissue visualised (*axillary portion of breast not to be included at expense of medial portion)

Nipple in profile

Nipple in midline of imaged breast



M – MODERATE

Most breast tissue imaged.

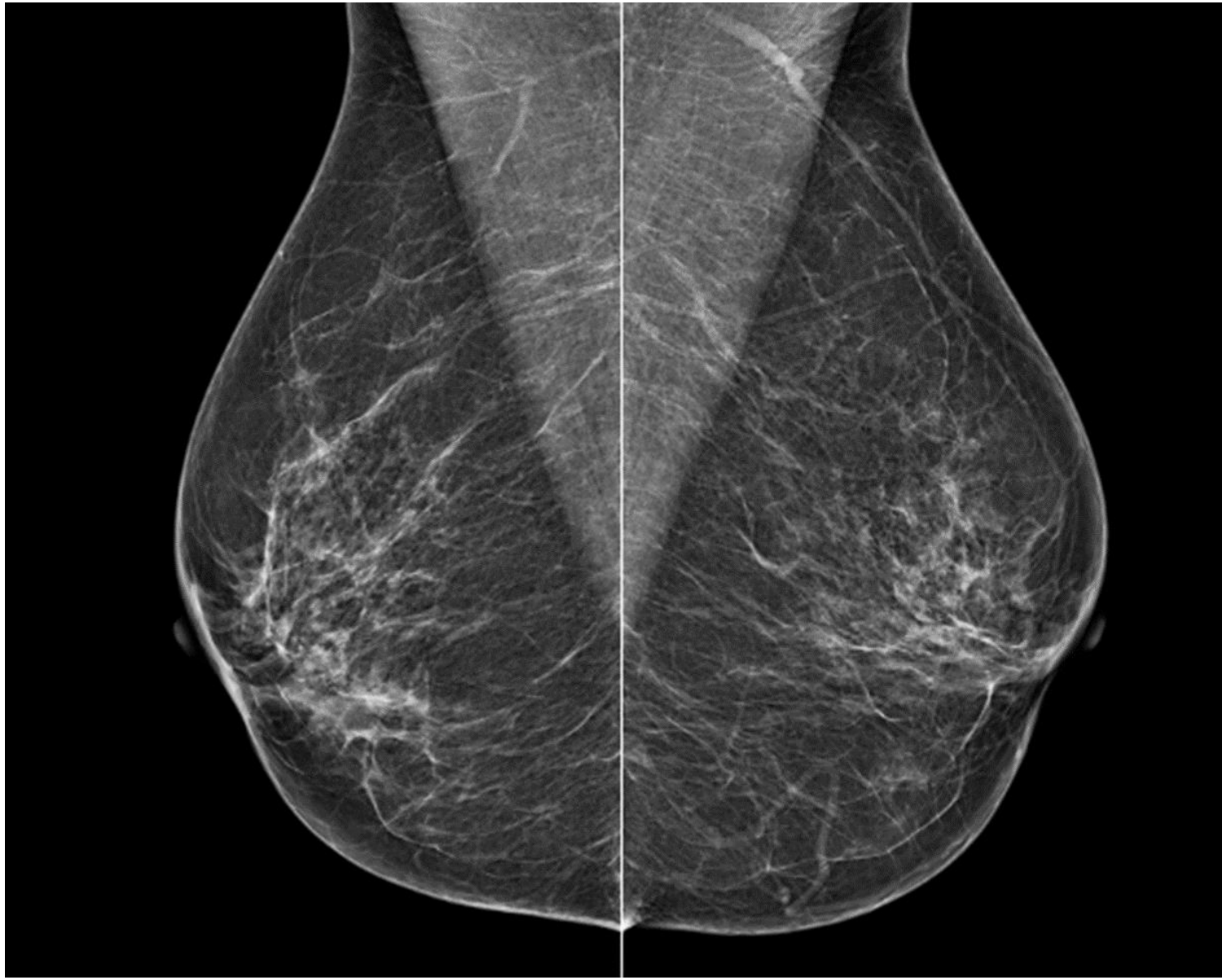
Pectoral muscle to nipple level.

Nipple in profile

Both IMF not clearly demonstrated but breast tissue adequately shown (i.e.– length of pec and nipple uplift)

Case 11

Overall study grade M



M – MODERATE

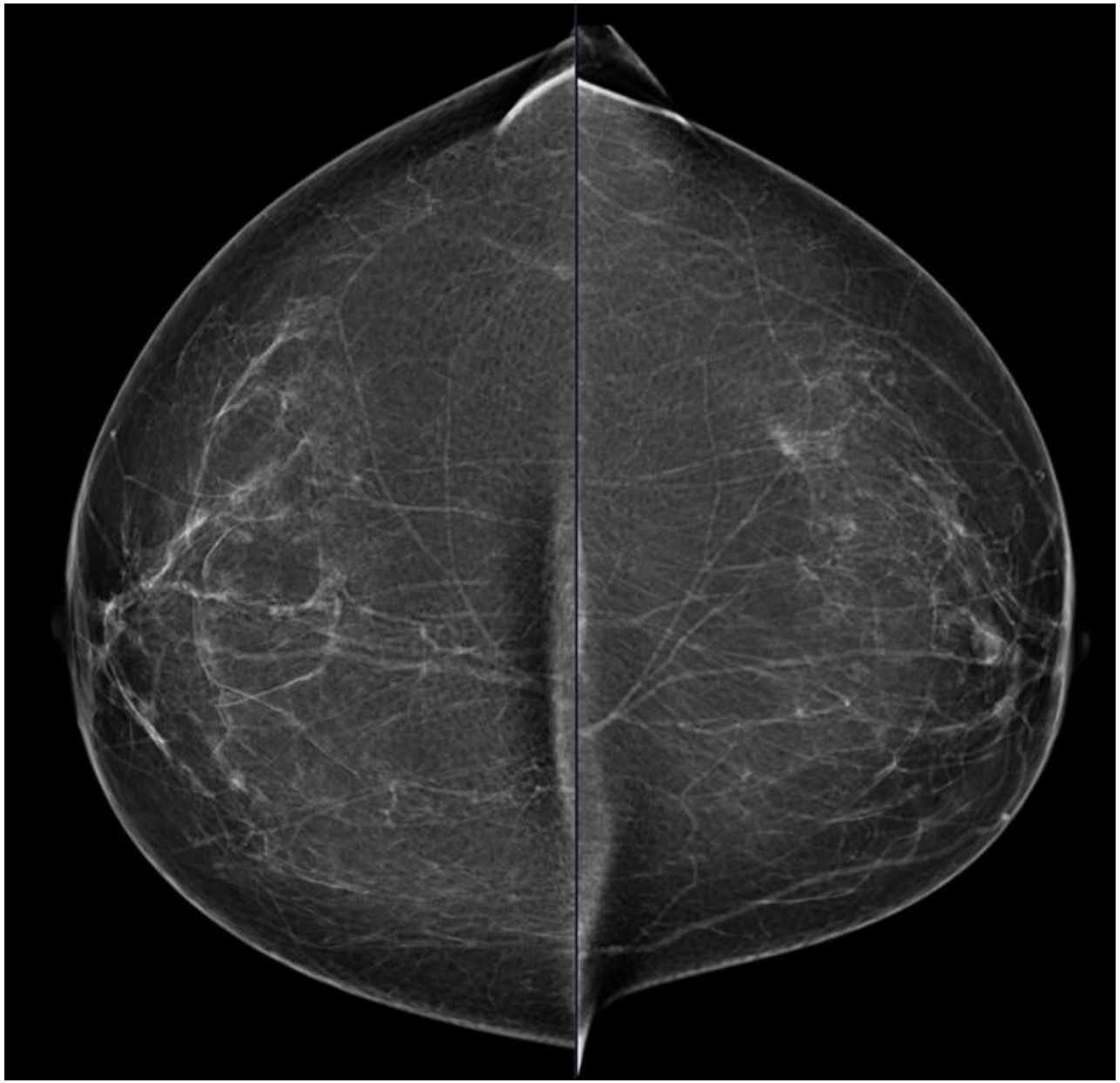
All breast tissue imaged, all postero-medial tissue visualized

Nipples transected

Nipple in midline

Creases /fold central and medially on CCs – air gap artefact seen centrally on RCC

Creases at lateral aspects



M – MODERATE

All breast tissue imaged.

Pectoral muscle to nipple level

Nipple in profile/transected

IMF clearly demonstrated through underlying breast tissue folds/creases.

Case 12

Overall study grade M

G- GOOD

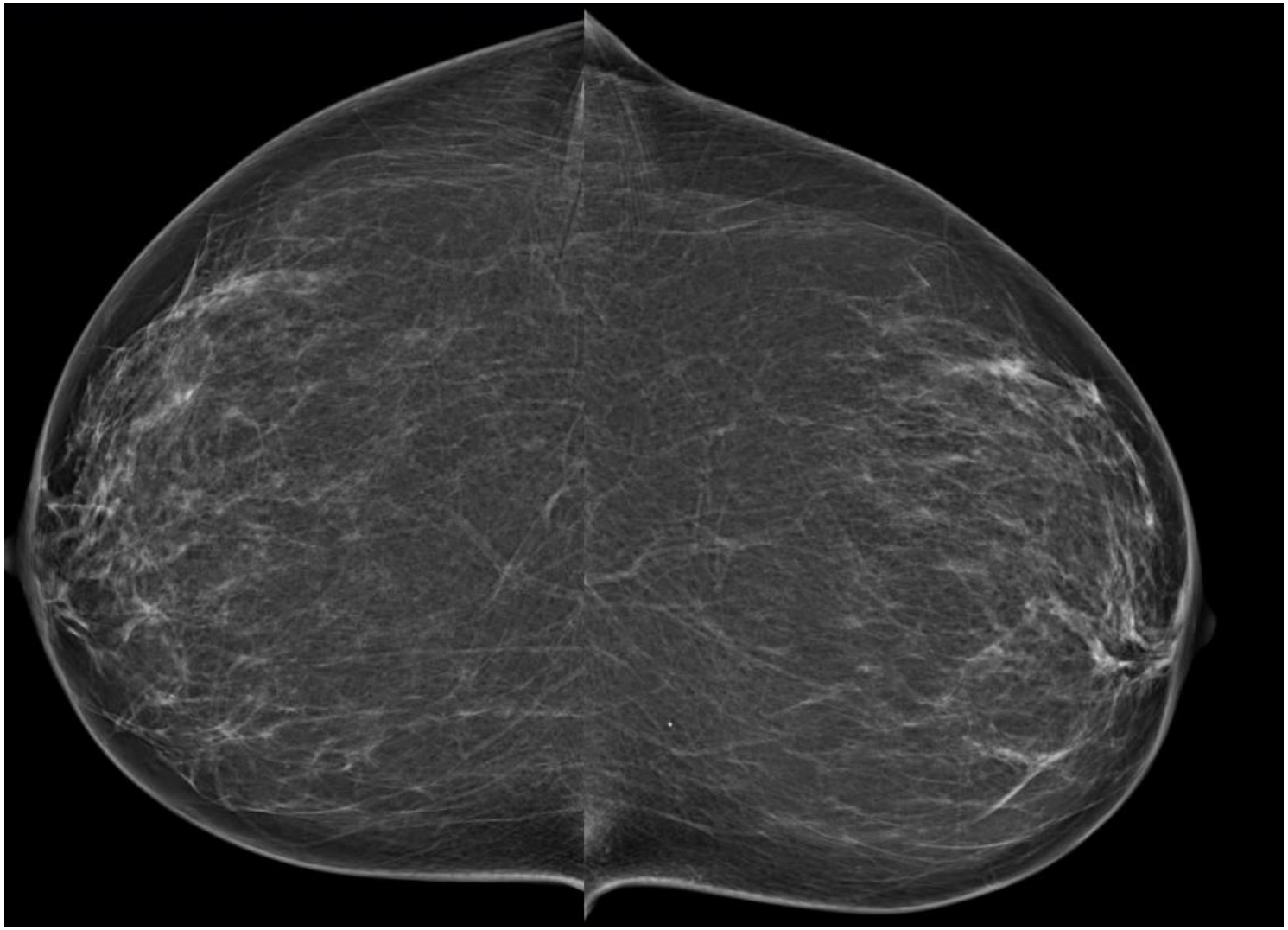
All breast tissue imaged*

All postero-medial tissue visualised (*axillary portion of breast not to be included at expense of medial portion)

Nipple in profile

Nipple in midline of imaged breast

Some faint creases lat LCC



M – MODERATE

All breast tissue imaged.

Pectoral muscle to nipple level

Nipple in profile/transected

IMF demonstrated though Twist fold /droop on L

Crease R breast axilla can see through

Case 13

Overall study grade M

G-GOOD

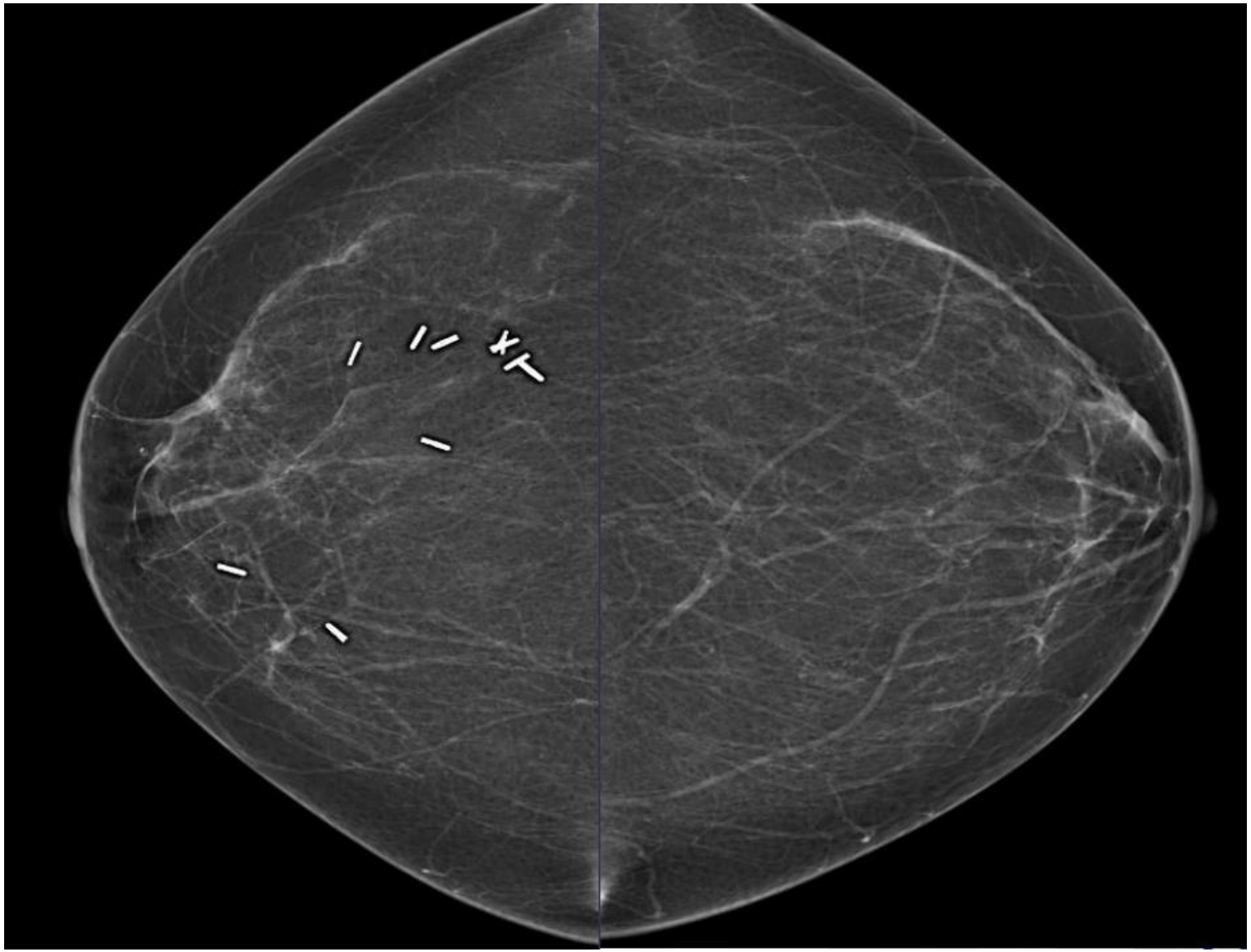
All breast tissue imaged*

All postero-medial tissue visualised (*axillary portion of breast not to be included at expense of medial portion)

Nipple in profile

Nipple in midline of imaged breast

**LCC lateral cut off- some departments may not accept this therefore adhere to local departmental policies **



G-GOOD

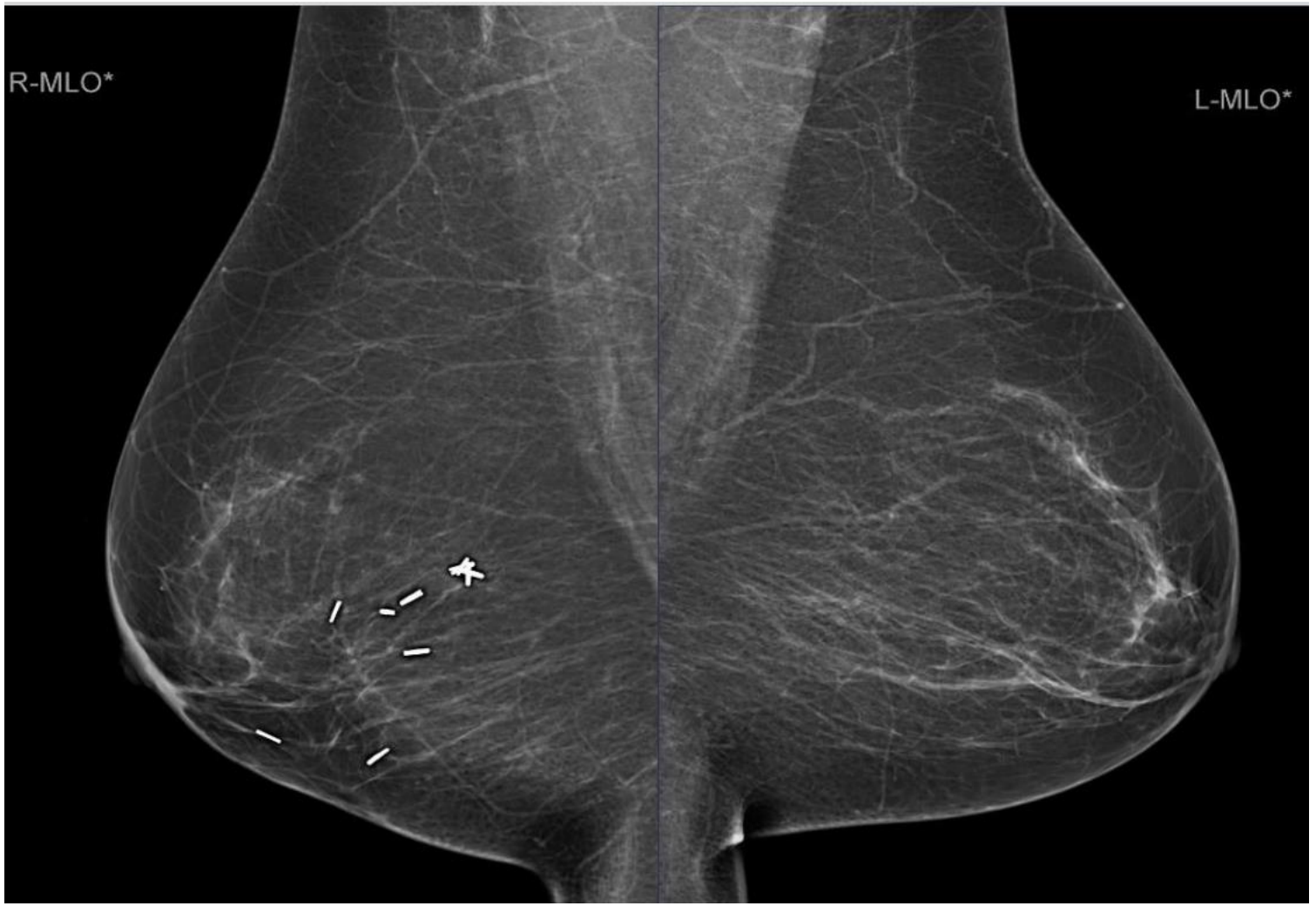
All breast tissue imaged
Pectoral muscle well demonstrated

Nipple in profile or skin edge seen transecting nipple

Infra-mammary angles (IMF) well demonstrated
(slight twist L IMF)

Case 14

Overall study grade G



INADEQUATE

I = INADEQUATE IMAGES (applies to both CC and MLO images)

1. Significant part of the breast not imaged.
2. Incomplete or incorrect identification.
3. Incorrect exposure.
4. Inadequate compression which hinders diagnosis.
5. Blurred image.
6. Incorrect image processing.
7. Overlying artefacts.
8. Skin folds which obscure the image.

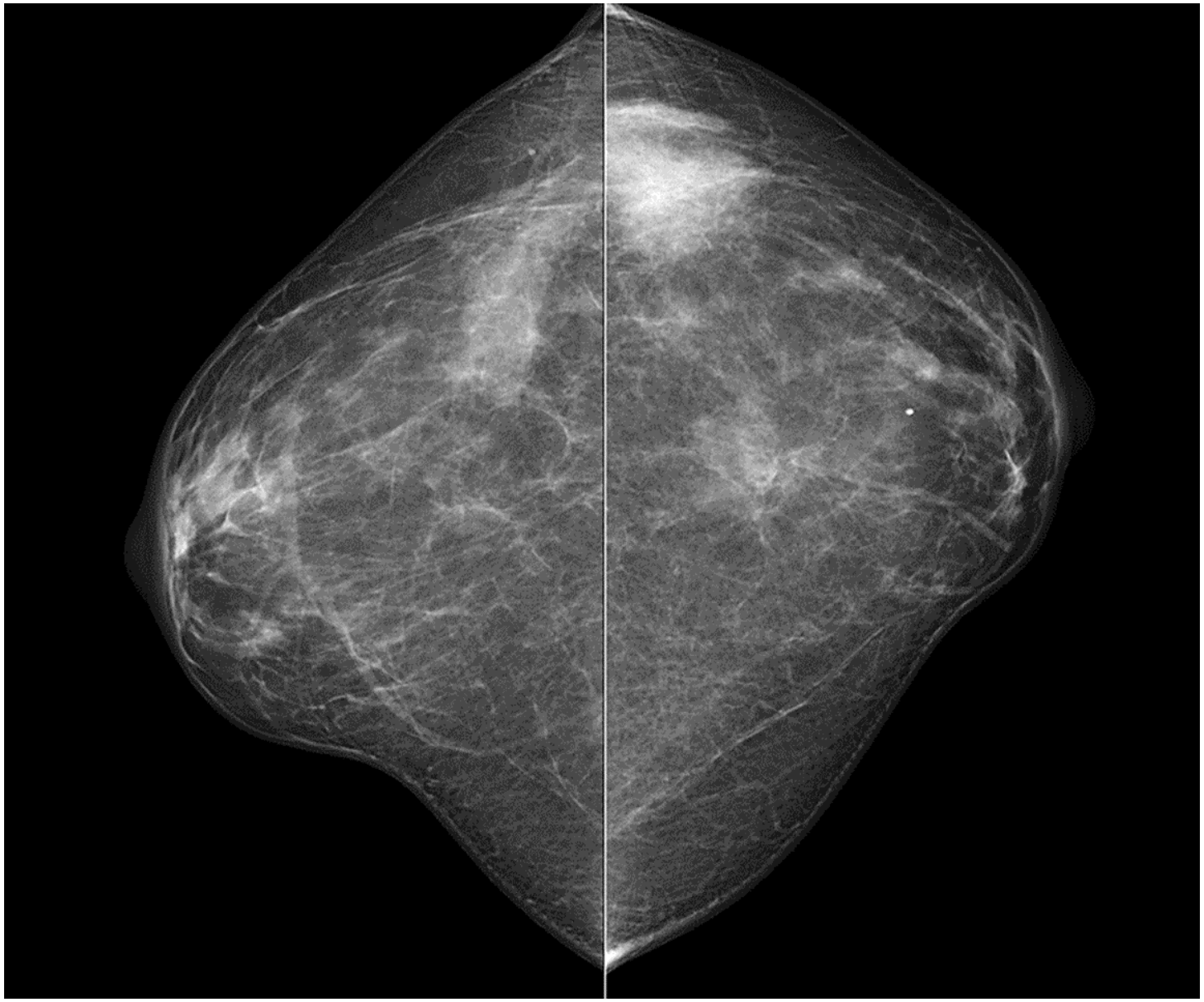
I -INADEQUATE grading sometimes results despite best efforts of radiographer. Client may have reason such as has physical limitations that mean it is not possible to demonstrate all the breast tissue well . It is important to include notes for radiologists if any limitations to optimal imaging

I- INADEQUATE

Missing tissue LCC lateral aspect

Nipple in midline

(Unusual anatomical shape)



I- INADEQUATE

Most breast tissue imaged on L but not on R.

Pectoral muscle not to nipple level on L and missing on the R.

Nipple in profile

IMF not clearly demonstrated but breast tissue adequately shown through folds/creases.

(Notes -Shoulder issue awaiting operation - no pec able to be imaged on R)

Due to client's presentation which does not meet PGMI criteria.

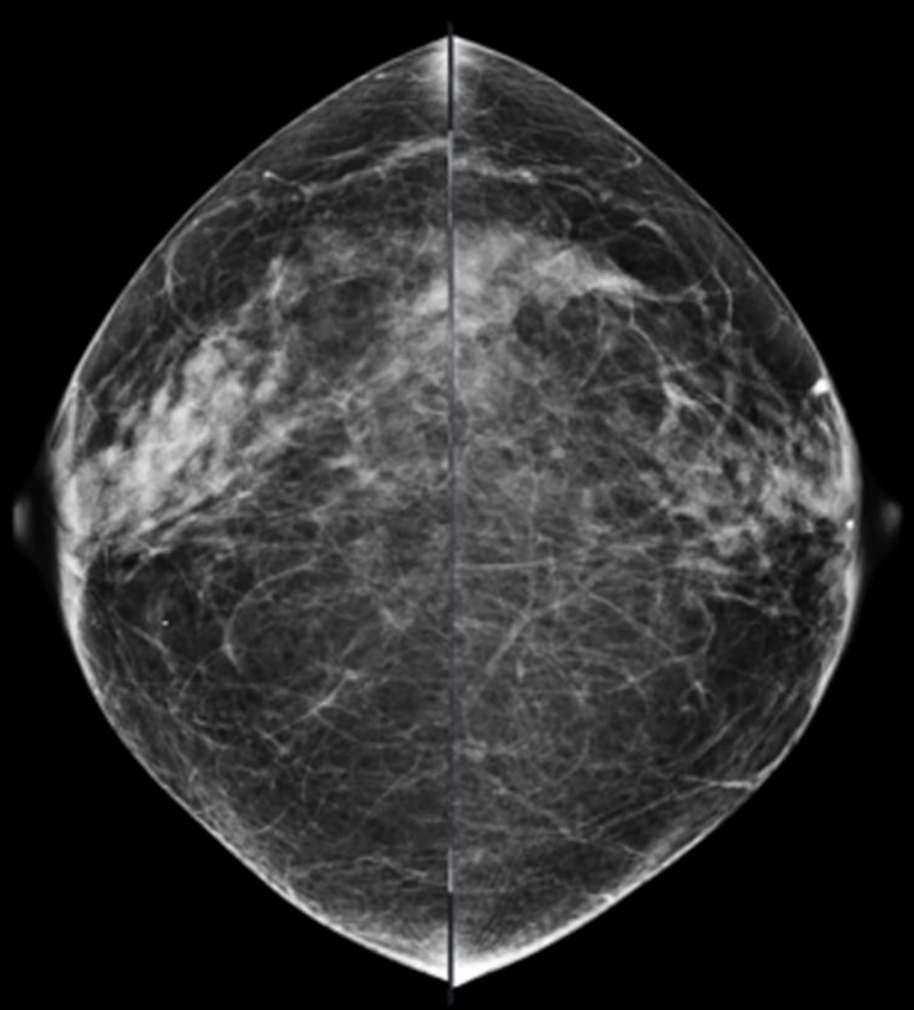
Case 15- Overall study grade - I

(On occasions, the resultant images may not meet minimum criteria, due to the client having physical or other limitations. These will be graded Inadequate despite being best achievable /possible in the circumstance)

CCs were short on PNL depth in comparison with MLOs .

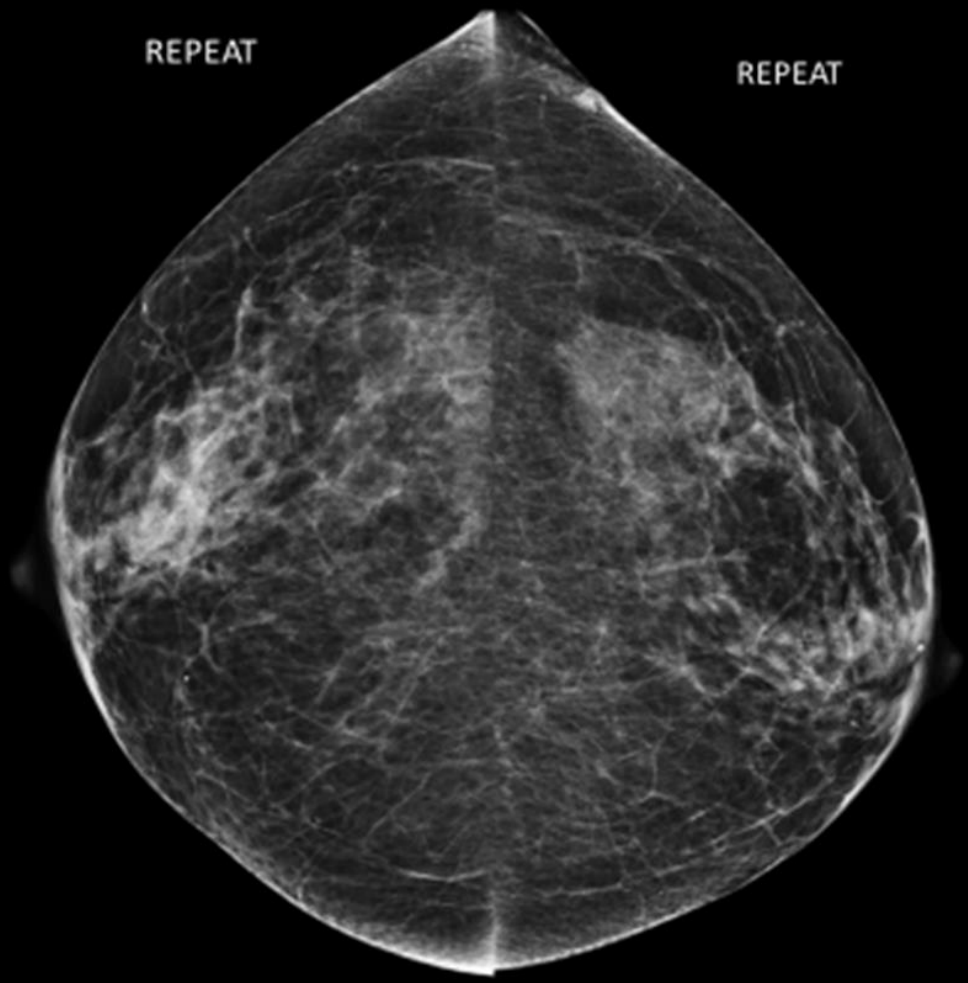
Using natural mobility of full breast optimally elevated and eased forward onto receptor in repeats shows improved depth of tissue

< CC depth in comp to MLOs



REPEAT

REPEAT

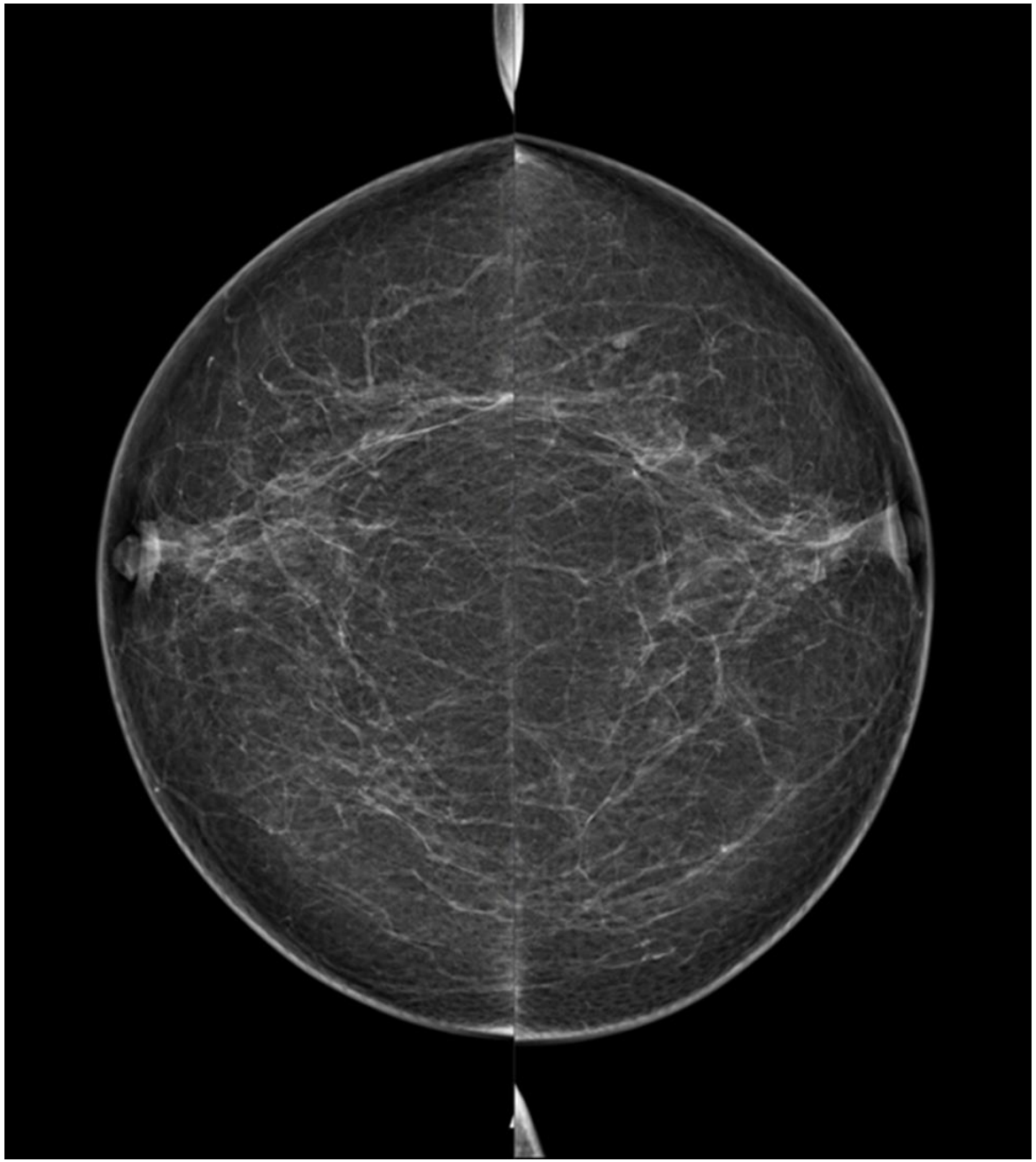


I- INADEQUATE

Significant part of the breast not imaged.

Nipple not in profile

(L not in profile on MLO either)



I- INADEQUATE

Pectoral muscle not to nipple level.

Nipple not in profile on L transected R

Both IMF not clearly demonstrated and tissue missing at chest wall.

Case 16

Overall grading is I

I- INADEQUATE

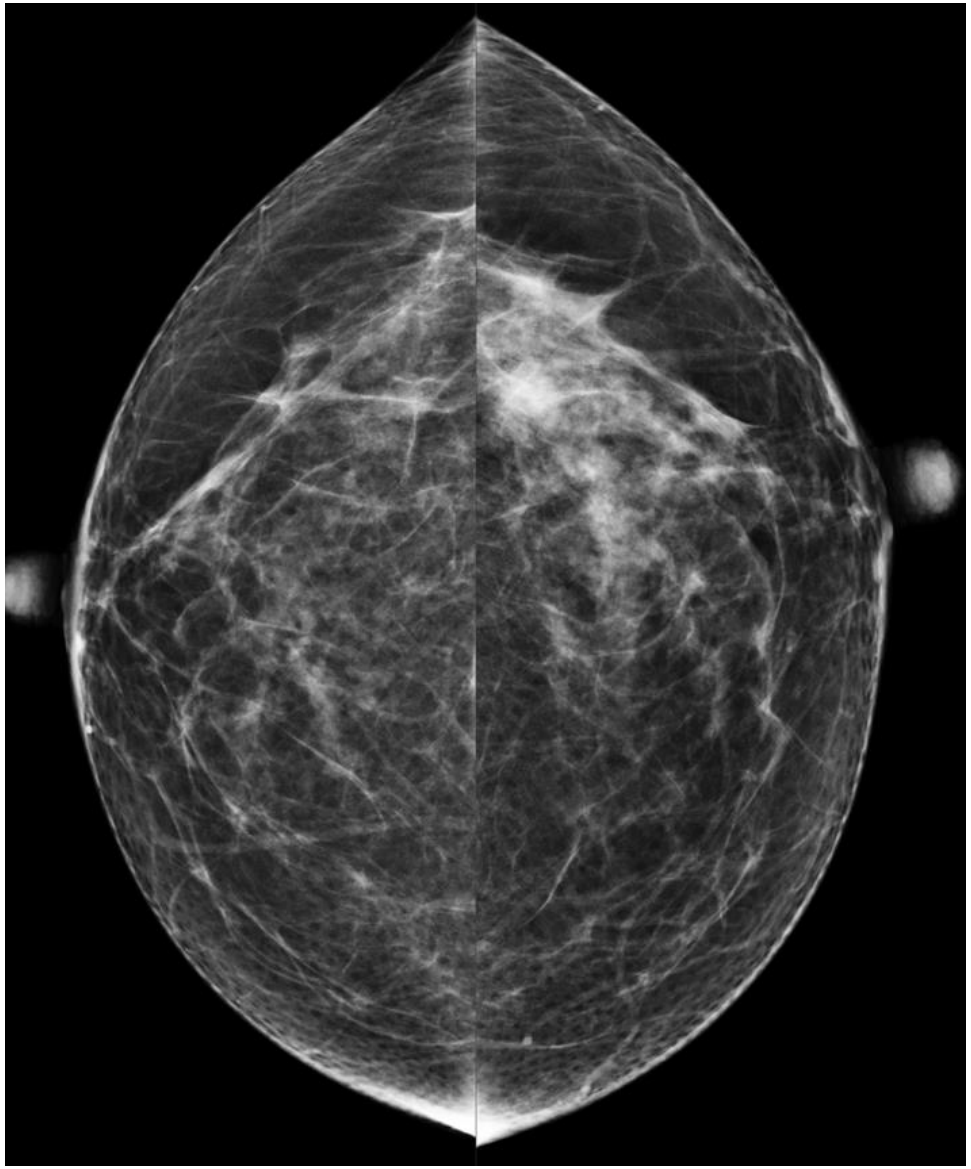
Missing tissue LCC

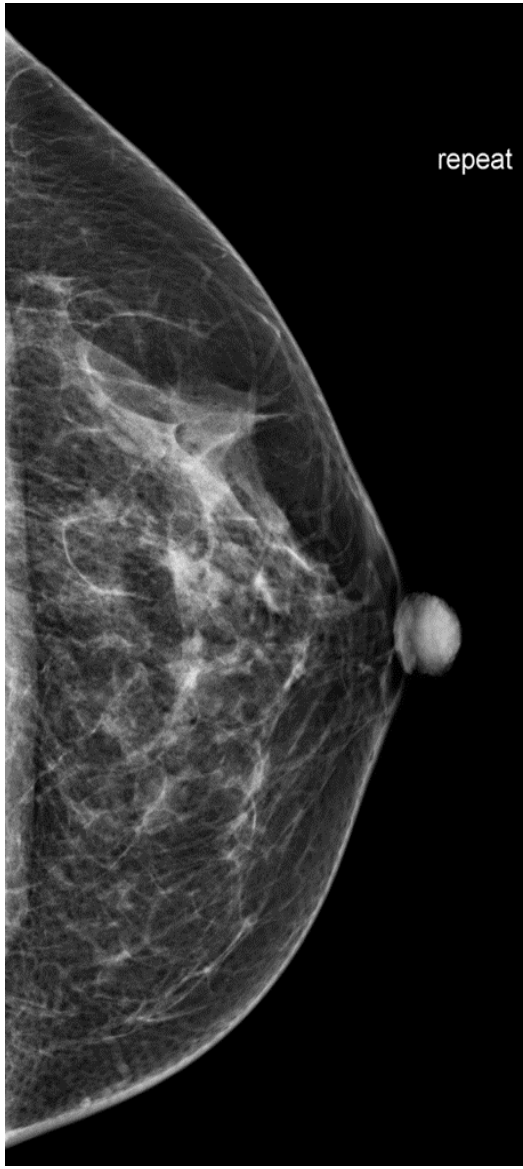
Nipple in profile

Nipple in midline R not

on L

(See recall tech repeat on far right)





G-GOOD

All breast tissue imaged

Pectoral muscle to nipple level.

Nipple in profile

IMF clearly demonstrated

Case 17

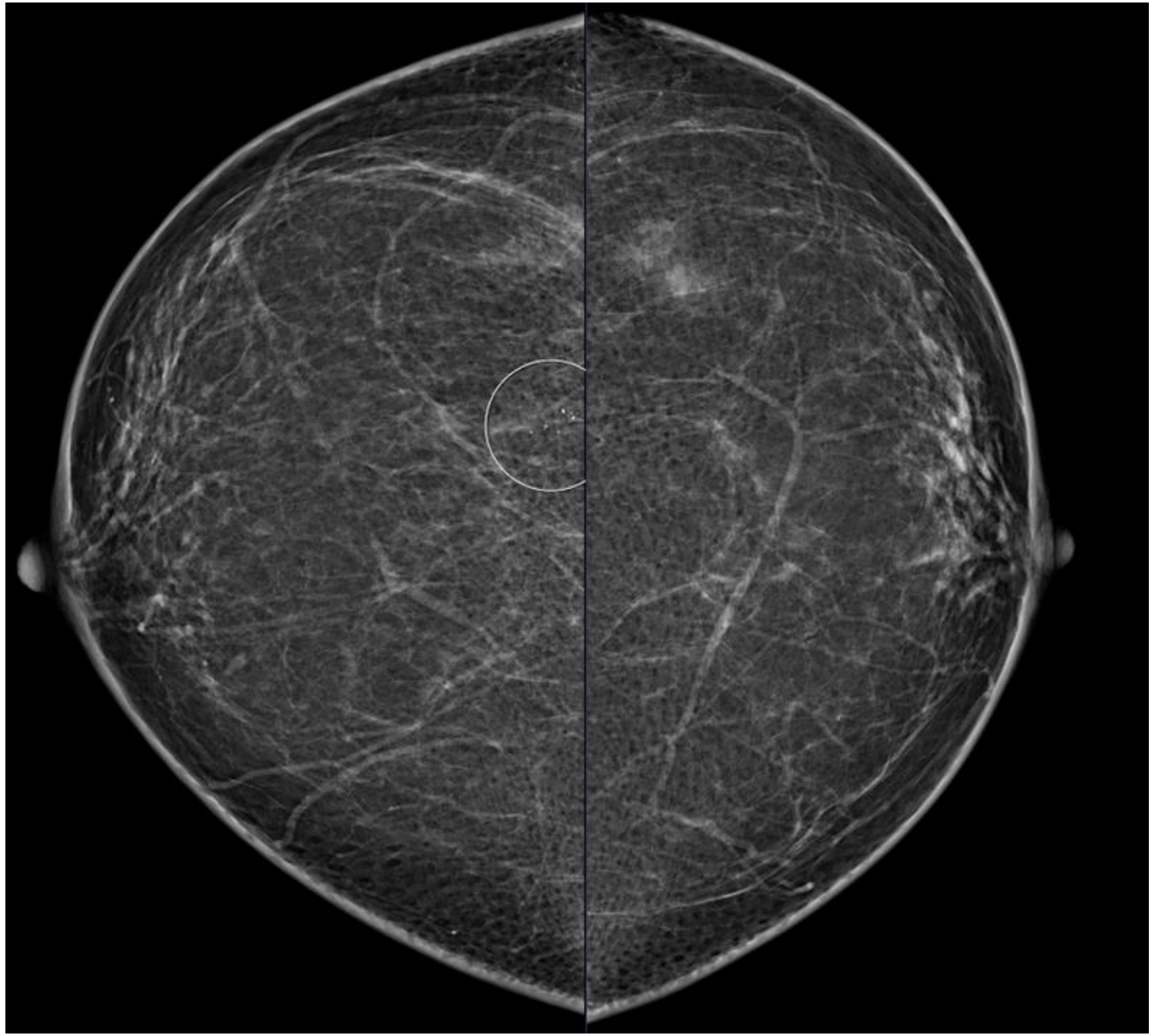
(Overall study grading - Inadequate due to CC grading (I) for initial screening mammogram)

I- INADEQUATE

Missing tissue depth LCC (PNL > 1cm difference with LMLO)

Nipple in profile

Nipple in midline on R and not on L



I- INADEQUATE

Missing breast tissue.

Pectoral muscle short not to nipple level

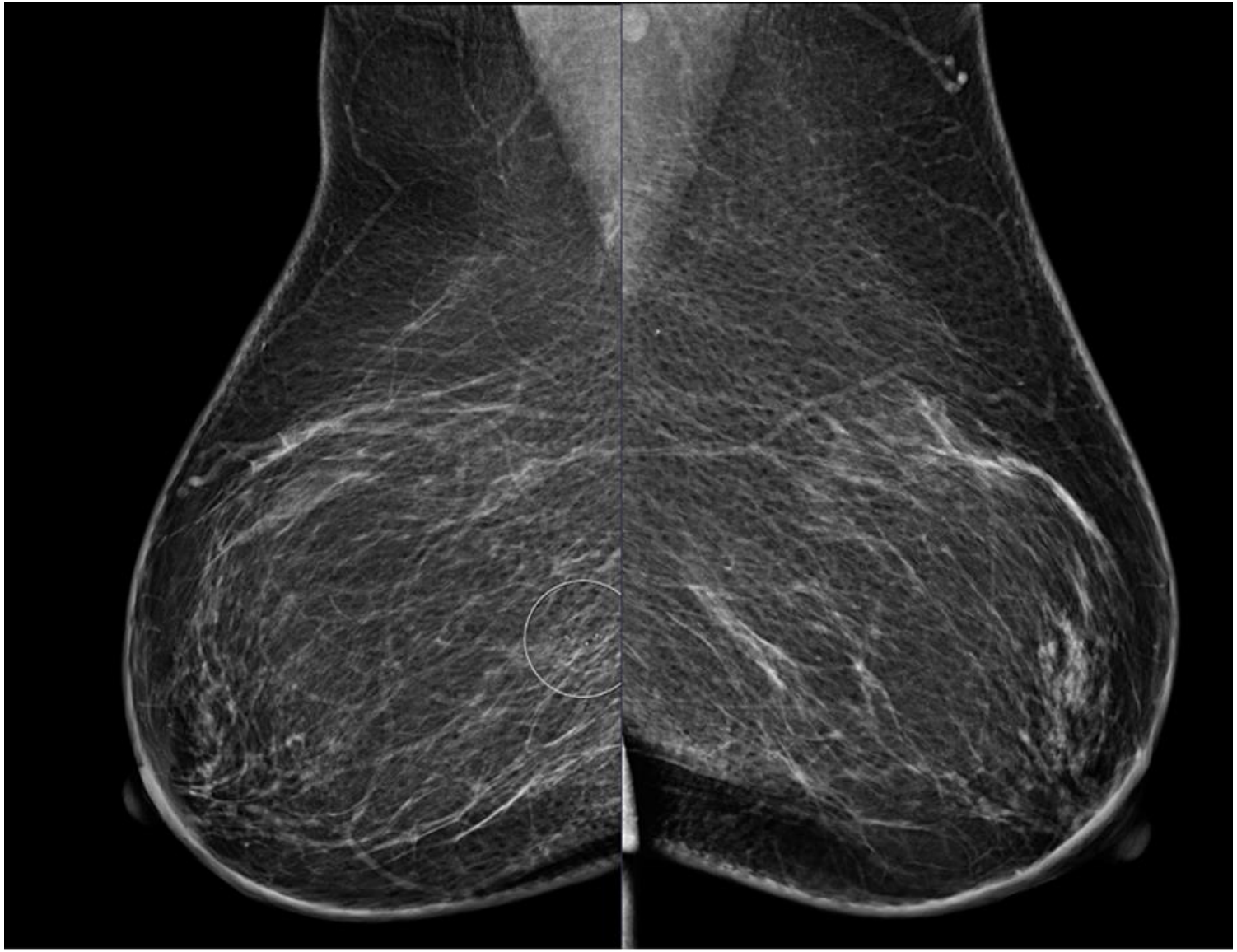
Nipple in profile

Both IMF not clearly demonstrated and tissue missing at chest wall.

Case 18

Overall study grading Inadequate

(Notes –client had physical limitations , sensitive to compression and BMI +++)



I - INADEQUATE

Missing breast tissue

Poor positioning significant underlying tissue at IMF causes air gap and poor compression

Nipple in profile

IMF not clearly demonstrated significant underlying tissue

Repeat Images below right

Grading - GOOD

Both IMF seen clearly

I - INADEQUATE

Missing superior breast tissue

Pectoral muscle not to nipple level.

Nipple in profile

IMF clearly demonstrated

Repeat Images below

Improved superior tissue and pec visualization

MODERATE = M

Both IMF not seen clearly

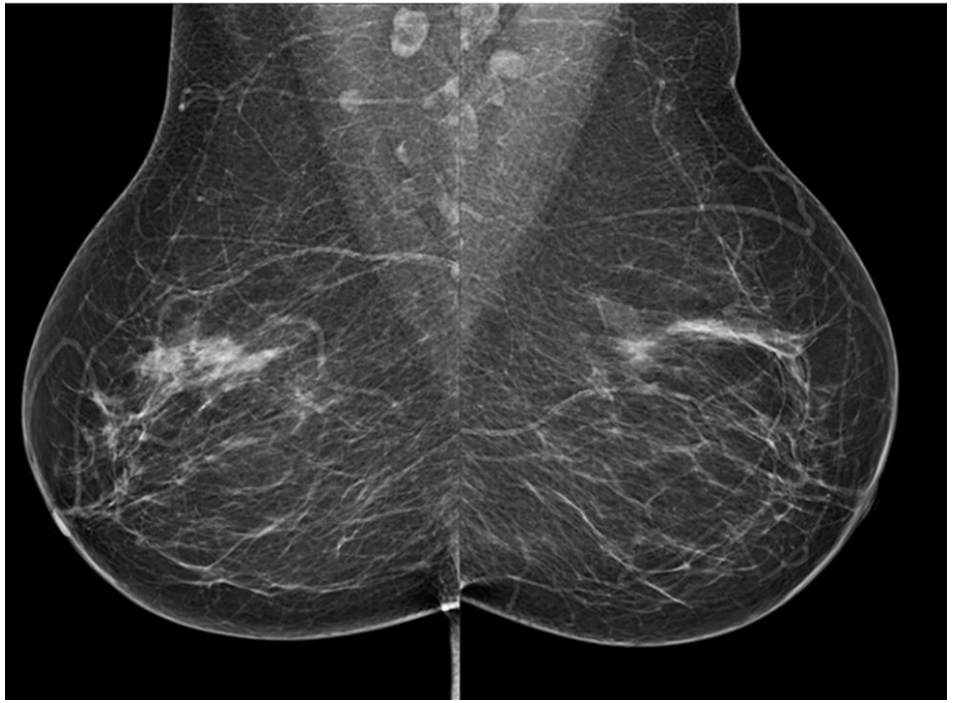


Image Review

- Image reviews are part of performance assessment in mammography.
- The PGMI grading criteria are used as a guide for self-assessment and random reviews undertaken by mammography supervisors and designated radiographers.
- In BreastScreen Australia the National Accreditation Standards require radiographers working in the program to achieve 50% P/G grading on an annual reviews of 50 random cases, as a minimum.
- Breastscreen Australia National Accreditation Standards

https://www.health.gov.au/sites/default/files/2023-04/breastscreen-australia-national-accreditation-standards-nas.pdf

- The PGMI grading criteria are used within the BSA training programs.

Image Review

- It is recognised that there is subjectivity in the interpretation and application of the PGMI criteria, which has been noted in the literature.
- However, it is acknowledged that some reference tool as guidance is required.
- The Volpara Analytics image quality software program is an adaptation of the PGMI criteria and input from radiographers. It is used increasingly across diagnostic and screening services to monitor imaging quality. It assesses and grades all images and provides an overall study grade. Results and performance can be viewed by individual or lead radiographers at any time and allows trends to be identified and results to be benchmarked across all users.
- There are other image quality software programs coming onto market.