Breast cancer screening

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ONCOLOGICAL (BREAST, THYROID, PARATHYROID, MELANOMA) & GENERAL SURGEON

Outline

- Case
- Triple test
- Population based screening
- High risk screening
- Use of MRI

Case - symptomatic

59F presented to your office with a few months history of left breast pain

History

- ❑ sharp intermittent pain

  near the upper part of L breast and in L axilla
- ❑ no breast lumps
- ❑ no nipple changes/ discharges
- ❑ no skin changes

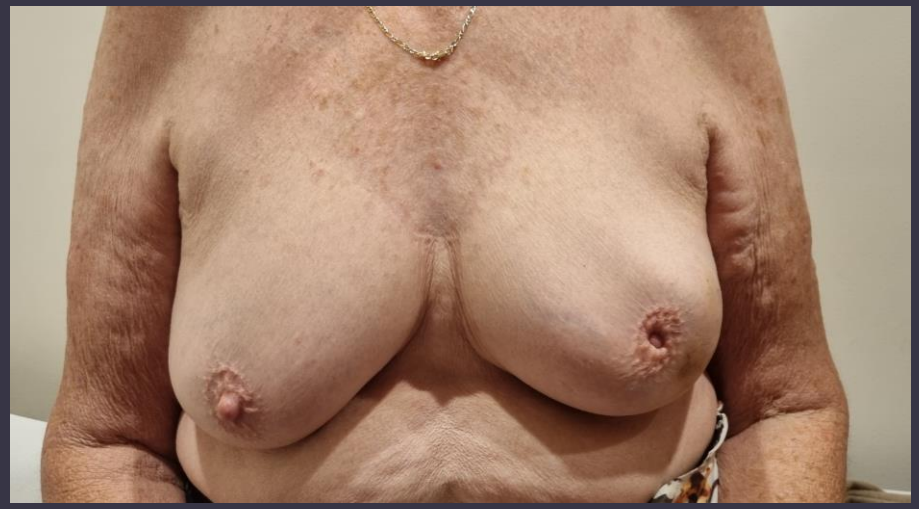
Risk assessment

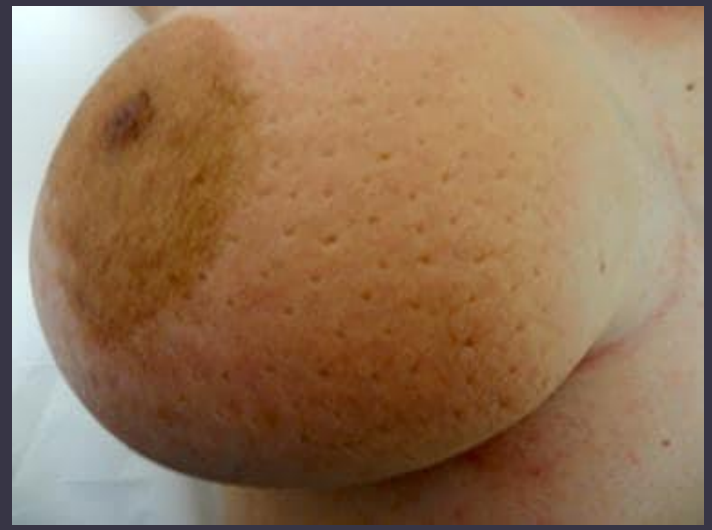
- ❑ no FHx of breast /ovarian cancers
- ❑ post menopausal, not on HRT
- ❑ 2 children – breast fed for 9 & 12 months
- ❑ routine screening with BS (due soon) – no previous recall/bx
- ❑ no previous breast surgery
- ❑ non smoker

Examination

- Inspection
- Palpation

Examples (not related to the case)

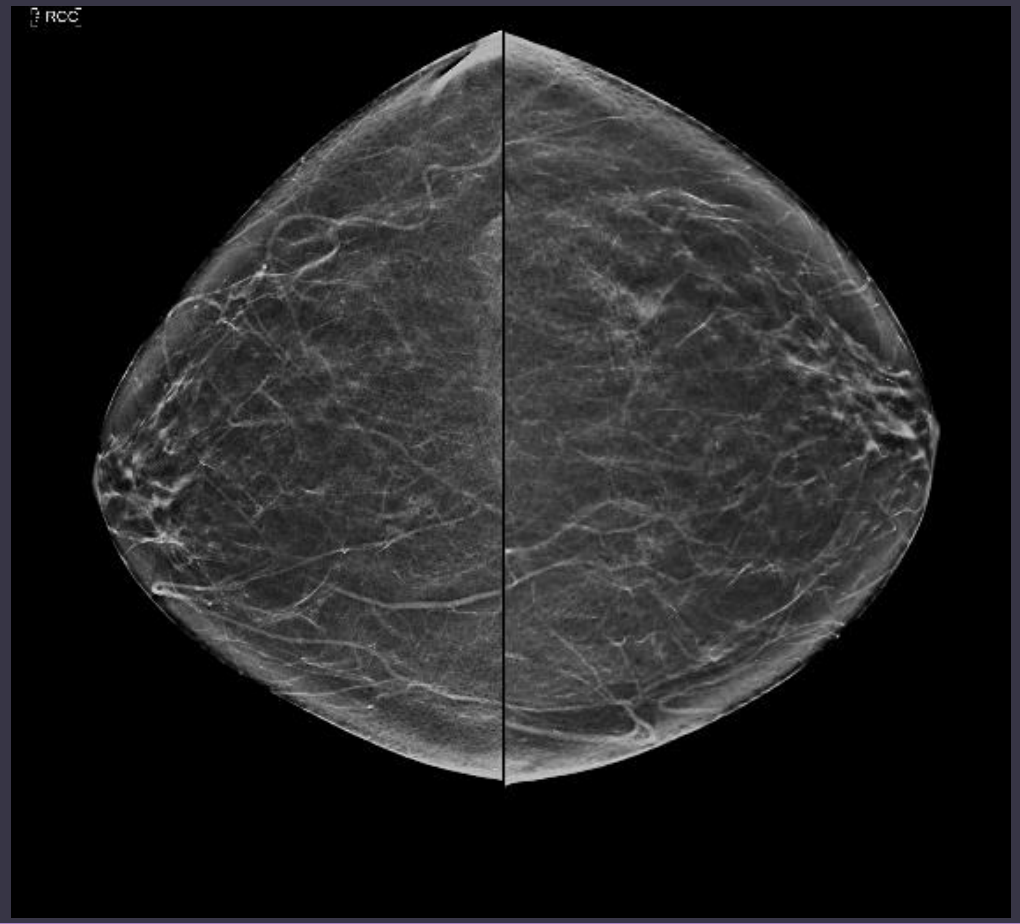


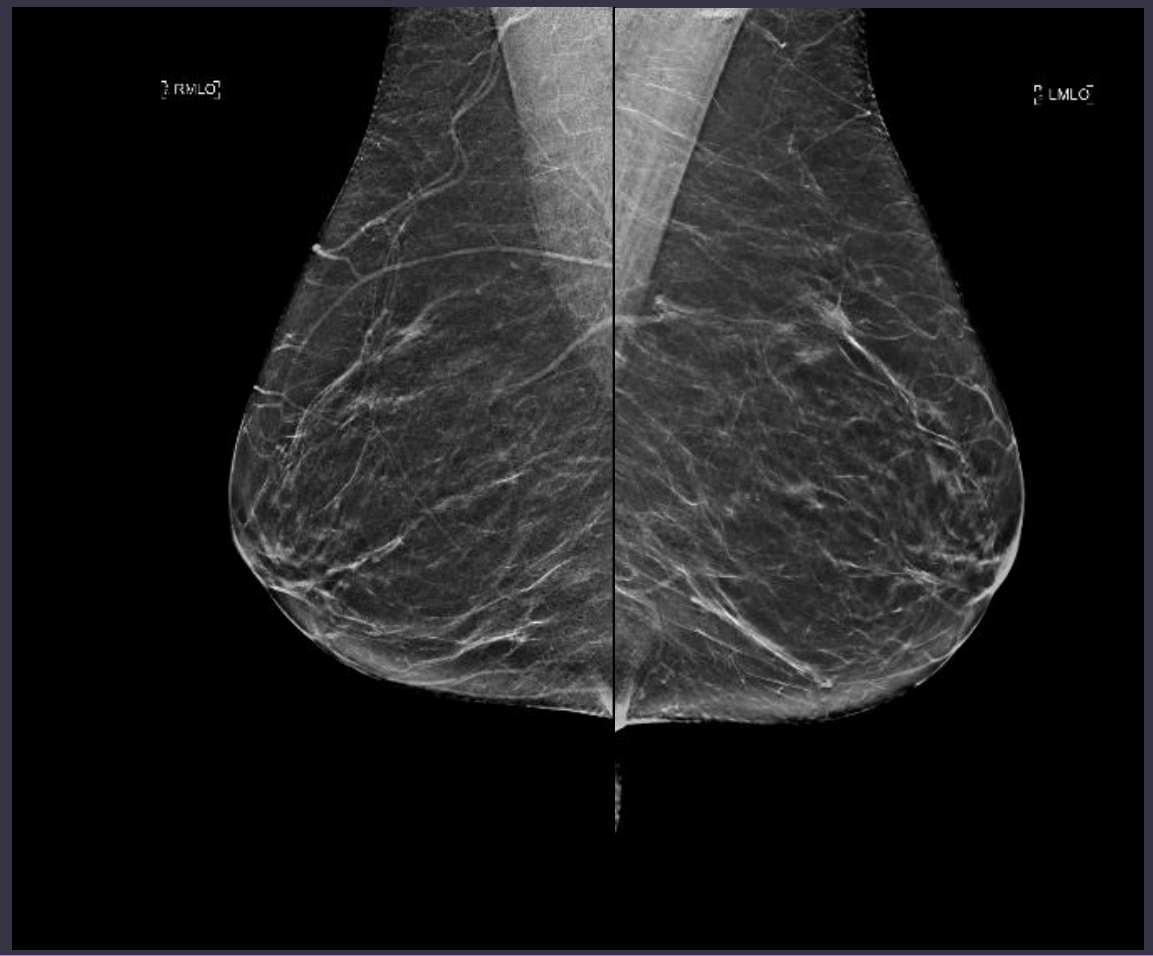


Triple Test

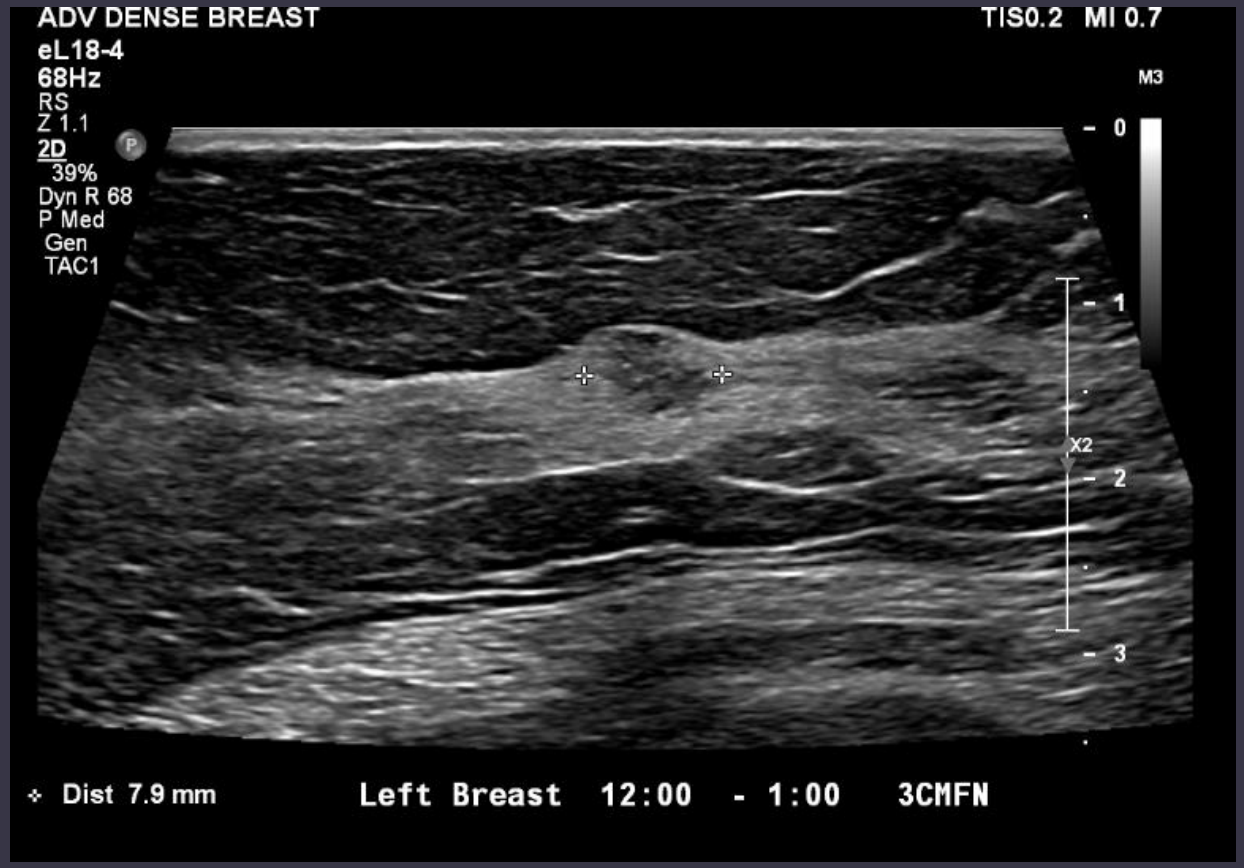
- Clinical – history and examination
- Imaging - mammogram and ultrasound
- Biopsy – FNA or core or open

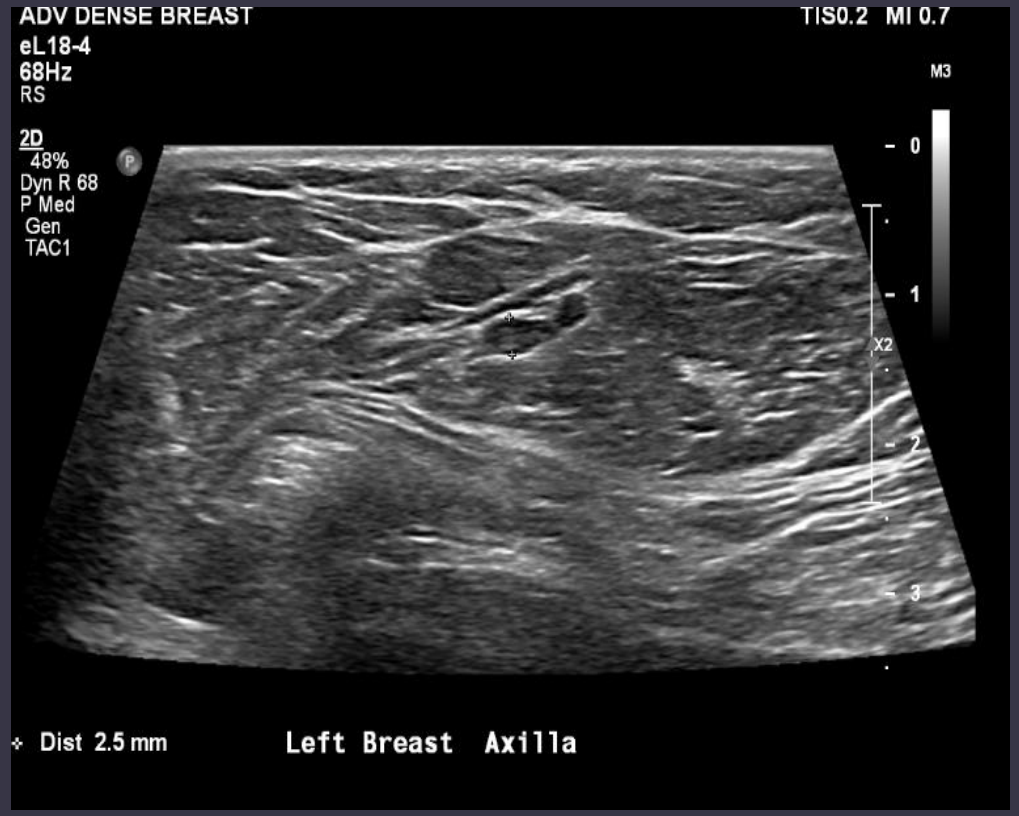
Bilateral mammogram





Bilateral breast ultrasound





us guided biopsy

- FNA
- only get cytology
  - C1 – non diagnostic
  - C2 – benign
  - C3 – atypical / indeterminate
  - C4 – suspicious
  - C5 – malignant
- useful in axillary LN, particularly if cancer proven
- however, if working up for lymphoma, best not to use FNA (not enough to do flow cytometry)

- core
- histological diagnosis
- invasive vs in-situ
- differentiate between subtype
- can do ER/PR/HER2

iPrevent

RESOURCES FOR CLINICIANS

iPrevent™ is a web-based computer application designed to estimate a woman's breast cancer risk and then provide breast cancer screening and prevention information that is personalised to that woman[1].

COSA Medication Gudelines - Clinicians

The data entry component of iPrevent™ asks about breast cancer risk factors including reproductive factors, lifestyle factors and history of previous breast disease, particularly lobular carcinoma in situ or atypical hyperplasia. Family history of breast, ovarian, prostate and pancreas cancer, including age at diagnosis, is collected (if exact ages are not known, estimates can be entered).

Once data entry is complete, iPrevent™ uses the inputted information to estimate breast cancer risk using a well validated, evidence-based mathematical algorithm: BOADICEA (via CanRisk) [2,3].

A risk category (as defined by Cancer Australia[4]) is calculated from the risk ratio of the estimated iPrevent™ residual lifetime risk to the residual lifetime population risk for a woman of the same age.

Risk categories	
Average risk	< 1.5 times population risk
Moderate risk (Somewhat increased)	1.5 to 3 times population risk
High risk (Substantially increased)	> 3 times population risk

The estimated effect of any risk-reducing intervention is calculated by applying the following reductions to both the residual lifetime risk and the 10-year risk (see footnote):

What information do the breast and ovarian cancer models use to determine risks?

Created by Tim Carver
Last updated: Dec 05, 2022 • 1 min read

Table of Risk Factors

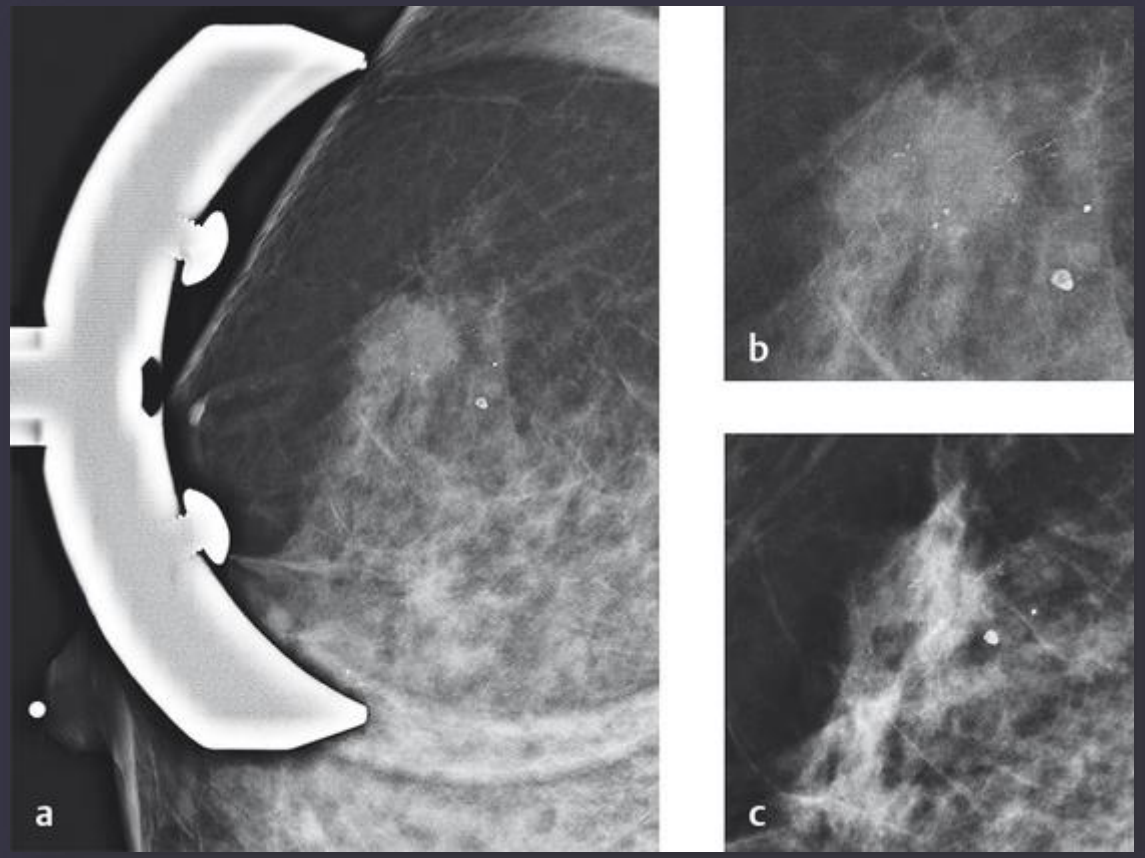
Risk Factor	Breast Cancer	Ovarian Cancer
Family and personal-proband history of breast, ovarian, prostate and pancreatic cancer	✓	✓
Rare pathogenic variants in moderate and high risk susceptibility genes	✓ BRCA1, BRCA2, PALB2, CHEK2, ATM, RAD51D, RAD51C, BARD1	✓ BRCA1, BRCA2, PALB2, RAD51D, RAD51C, BRIP1
Age information on unaffected family members	✓	✓
Ashkenazi Jewish origin	✓	✓
Information on year of birth to capture birth cohort	✓	✓
Age of menarche	✓	
Parity	✓	✓
Age at first live birth	✓	
Use of oral contraception	✓	✓
Use of menopause hormone therapy	✓	✓
Body mass index	✓	✓
Daily alcohol intake	✓	
Mammographic density	✓	
Height	✓	✓
Tubal ligation procedure		✓
Endometriosis		✓
Common cancer genetic susceptibility variants (Polygenic Risk Scores)	✓	✓

Population-based breast screening

- Asymptomatic patients
- Breast Screen Australia
  - Women aged 50-74 (invite from age 40)
  - Bilateral Mammogram (2D) every 2 years
  - If recall -> assessment clinic (Erina)
  - Bilateral Tomosynthesis +/- Spot or Magnification view
  - Target ultrasound only!

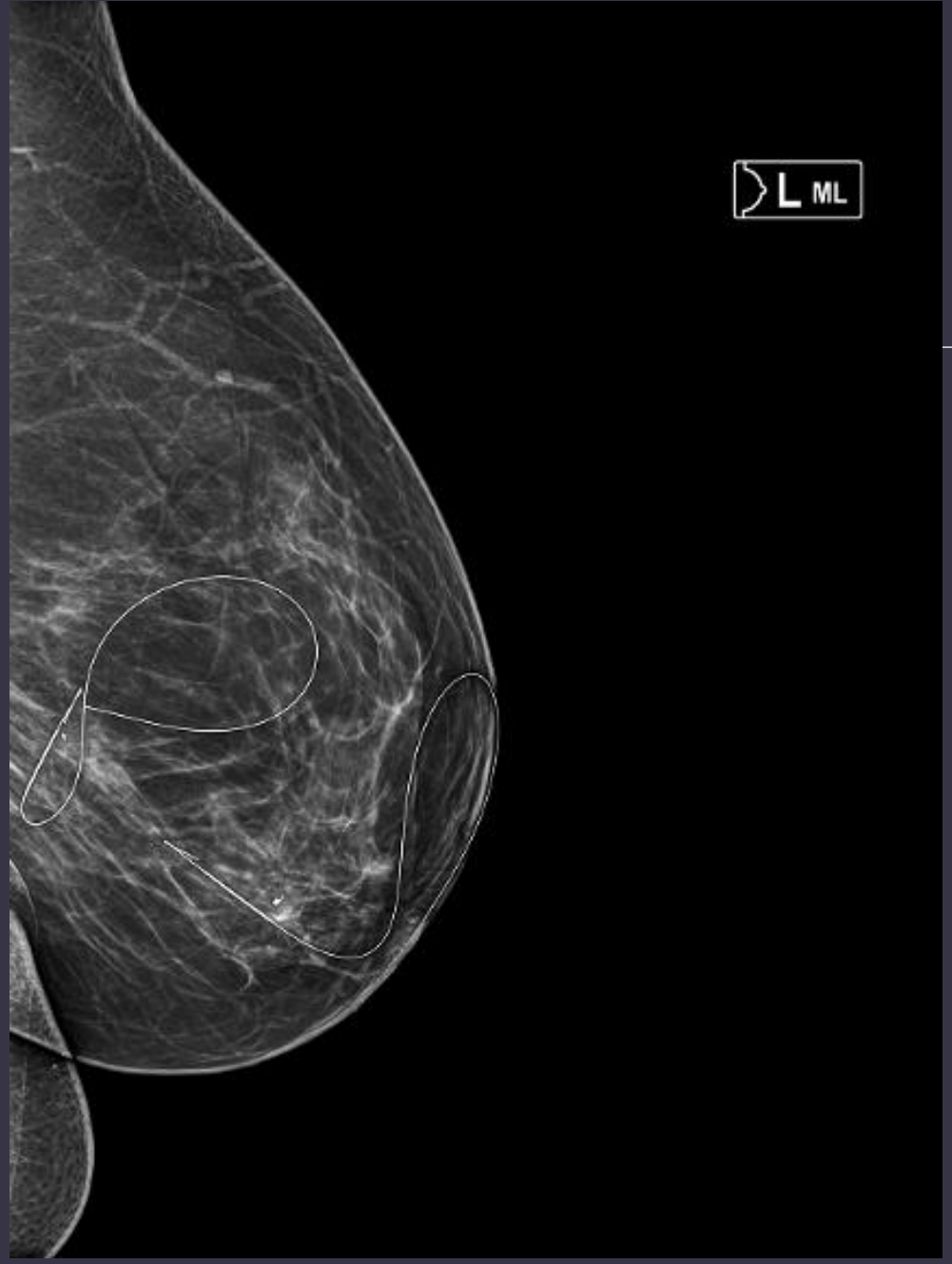
Mirocalcifications

- “indeterminate microcalcifications”
- “ for referral to breast surgeon to discuss about stereotactic biopsy”
- unless classic “tea cupping”, most others will be deemed indeterminate.
- if associated with a stellate lesion or with obvious pleomorphism, then will be deemed “suspicious microcalcifications”
- at present, only machine (other than Breast Screen Erina) that can do VAB is at PRP NG



Stereotactic Vacuum Assisted Biopsy (VAB)

- after VAB, needs to have specimen mammogram to confirm the cals are in the specimen
- clips are placed at the time to ensure the area can be identified at the time of surgery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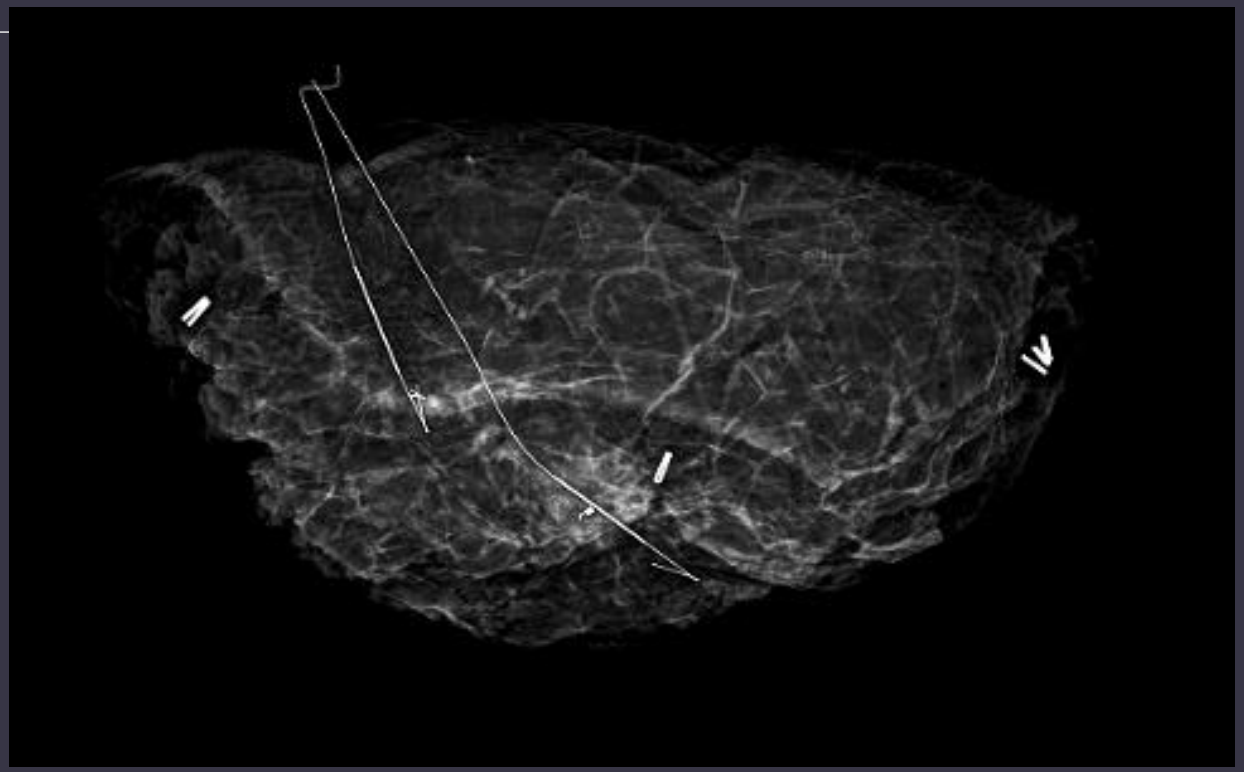

High risk screening

- High risk patients
  - known gene mutation carrier
  - Suspected gene mutation but personally not tested, ie women with first-degree relatives who are known mutation carriers
  - those with a family history suggesting inherited mutations (3 or more first and second degree relative)

- Annual screening – bilateral mammogram, breast ultrasound and MRI
  - If known gene carrier, start breast MRI and breast ultrasound from age 25-30 or 5 years younger than the index patient's age. Add on mammogram from age 35
  - Revert back to just bilateral mammogram and breast ultrasound after age 60

- Hereditary Breast Cancer Clinic

Referral to a clinical genetics service or familial cancer centre should be considered for all people meeting the categories below.

Pathogenic variant identified in the family
UNTESTED adult blood relative of a person with an identified pathogenic variant in a breast and/or an ovarian cancer predisposition gene (e.g. BRCA1 or BRCA2, TP53, PTEN, STK11, PALB2, CDH1)

Tumour pathology
Characteristics that warrant **referral** irrespective of other factors
Triple negative breast cancer (TNBC) diagnosed ≤50 years (TNBC: oestrogen, progesterone and HER2 receptor negative)

For those with a personal history of cancer
Individual characteristics that warrant **referral** irrespective of other factors
Male breast cancer at any age
Breast cancer and Jewish ancestry
Two primary breast cancers in the same person, where the first occurred <60 years
Two or more different but associated cancers in the same person at any age (e.g. breast and ovarian cancer)
Breast cancer diagnosed ≤40 years
Lobular breast cancer AND a family history of lobular breast or diffuse-type gastric cancer
Breast cancer diagnosed <50 years with limited family structure or knowledge (e.g. adopted)
Breast cancer and a personal or family history suggestive of: • Peutz-Jeghers syndrome (oral pigmentation and/or gastrointestinal polyposis) • PTEN hamartoma syndrome (macrocephaly, specific mucocutaneous lesions, endometrial or thyroid cancer) • Li-Fraumeni syndrome (breast cancer <50 years, adrenocorticocarcinoma, sarcoma, brain tumours)

For those with a family history of cancer
Characteristics sufficient to warrant **referral** irrespective of other factors
Two 1st or 2nd degree relatives diagnosed with breast or ovarian cancer **plus** one or more of the following on the same side of the family:* • additional relative(s) with breast or ovarian cancer • breast cancer diagnosed <50 years • more than one primary breast cancer in the same woman • breast and ovarian cancer in the same woman • Jewish ancestry • breast cancer in a male • pancreatic cancer • high grade (> Gleason 7) prostate cancer

Breast MRI

- MRI is a highly sensitive test for detecting breast cancer.
- The sensitivity of MRI for invasive and in-situ cancers are 94-99% and 50- 80%
- Reported sensitivity on MRI of 81% for multifocal, multicentric cancer compared with that of mammography alone (48%) and with a combination of mammography and sonography (63%) (Hlawatsch et al)

TABLE 5 Sensitivity and Positive Predictive Value of Mammography and MRI in Detecting 188 Malignant Foci in 99 Breasts for Different Patterns on Mammography

Statistics	Fatty Breasts			Scattered Fibroglandular, Heterogeneously Dense, and Extremely Dense Patterns			Total		
	Mammography	MRI	*p*	Mammography	MRI	*p*	Mammography	MRI	*p*
Sensitivity	75% (56/75)	80% (60/75)	NS	60% (68/113)	81% (92/113)	< 0.001	66% (124/188)	81% (152/188)	< 0.001
Positive predictive value	73% (56/77)	65% (60/92)	NS	78% (68/87)	71% (92/130)	NS	76% (124/164)	68% (152/222)	NS

Note.—McNemar test was used for comparisons of sensitivity and chi-square test for comparisons of positive predictive values. NS = not significant.

Sardanelli et al

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Group I5 - Magnetic Resonance Imaging

Subgroup 19 - Scan Of Body - For Specified Conditions

MRI scan of both breasts for the detection of cancer in a patient, if:

(a) a dedicated breast coil is used; and

(b) the request for the scan identifies that the patient is asymptomatic and is younger than 60 years of age; and

(c) the request for the scan identifies that the patient is at high risk of developing breast cancer due to one or more of the following:

(i) genetic testing has identified the presence of a high risk breast cancer gene mutation in the patient or in a first degree relative of the patient;

(ii) both:

(A) one of the patient's first or second degree relatives was diagnosed with breast cancer at age 45 years or younger; and

(B) another first or second degree relative on the same side of the patient's family was diagnosed with bone or soft tissue sarcoma at age 45 years or younger;

(iii) the patient has a personal history of breast cancer before the age of 50 years;

(iv) the patient has a personal history of mantle radiation therapy;

(v) the patient has a lifetime risk estimation greater than 30% or a 10 year absolute risk estimation greater than 5% using a clinically relevant risk evaluation algorithm; and

(d) the service is not performed in conjunction with item 55076 or 55079

Applicable not more than once in a 12 month period (R) (Contrast)

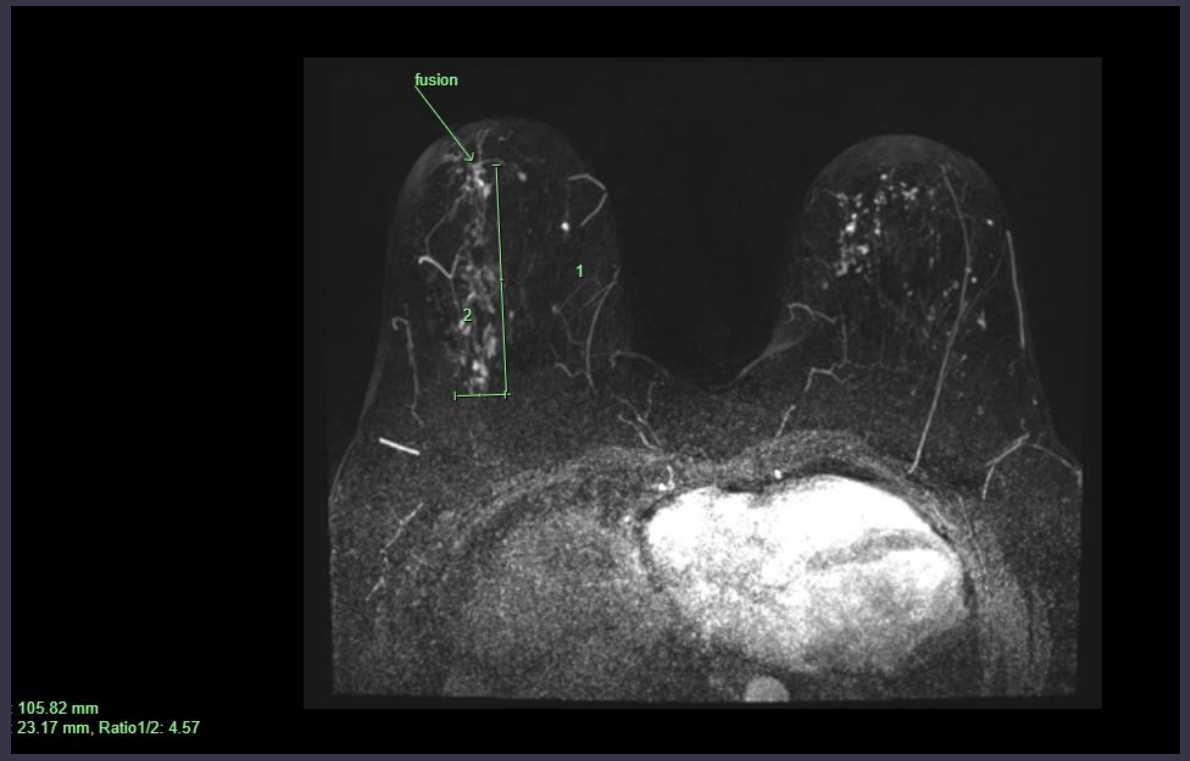
MRI – 1) High Risk screening

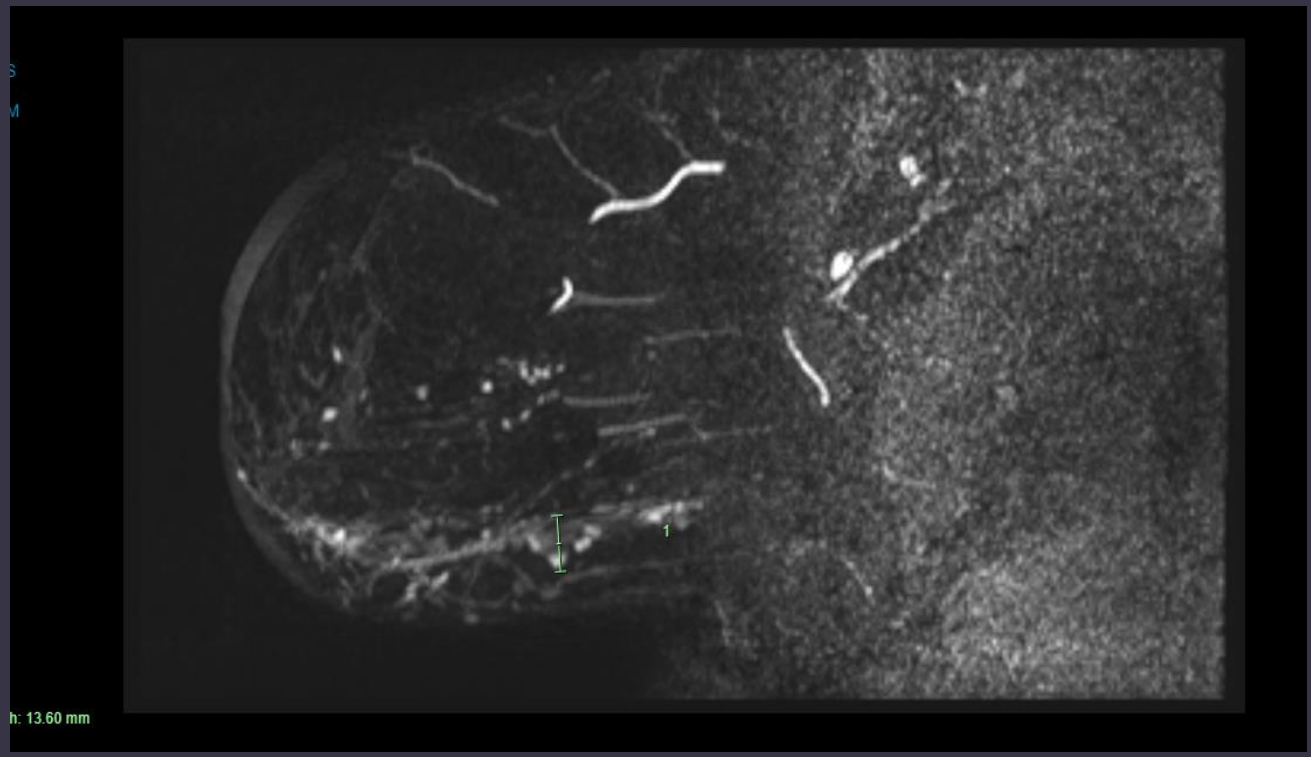
- Gene mutation carrier
- Not use for routine screening of women with average/ population risk
  - FALSE POSITIVE – pre-test probability too low
  - Difficult to arrange MR guided biopsy (lesion may not be seen on fusion/ target ultrasound)
  - Unnecessary anxiety

MRI – 2) Pre-operative assessment

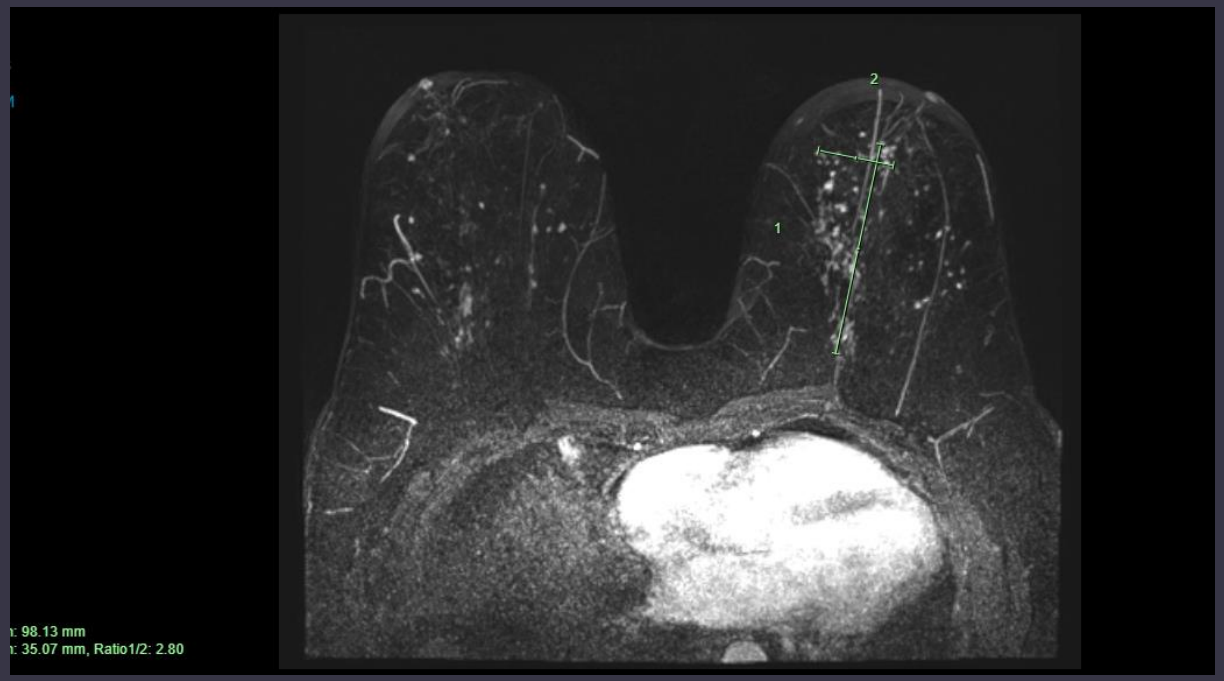
- For lobular cancer, high grade DCIS, dense breasts
  - Mammographic sensitivity for detecting invasive lobular carcinoma range from 34% to 81%, which is inversely related to mammographic density. Conversely, the reported sensitivity of MRI for invasive lobular carcinoma is 93% to 96%
  - The sensitivity of MRI was 92% for DCIS compared with only 56% by mammography. Of interest, MRI sensitivity was particularly strong in women with high-grade DCIS. (Kuhl et al.)

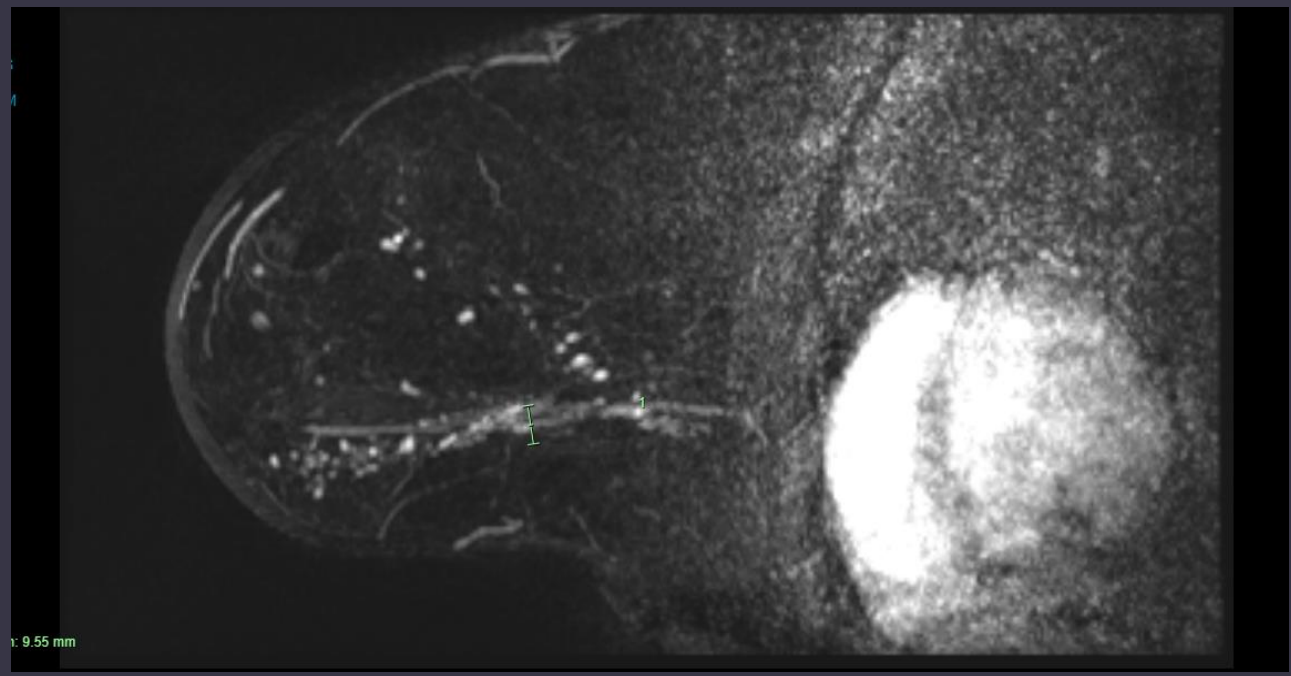
MRI –pre op assessment

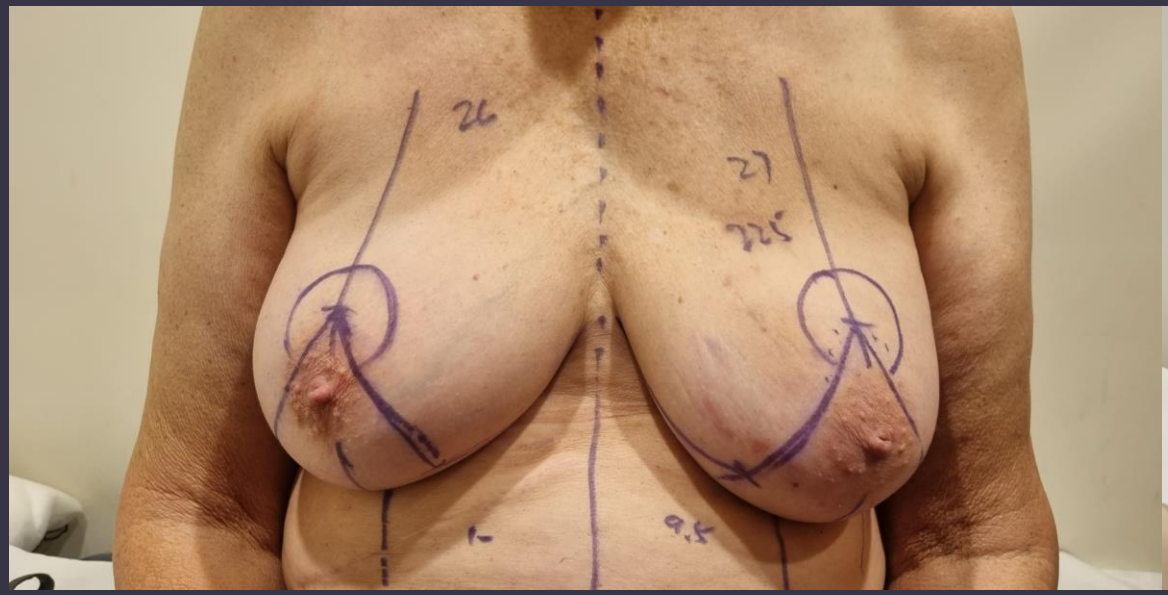


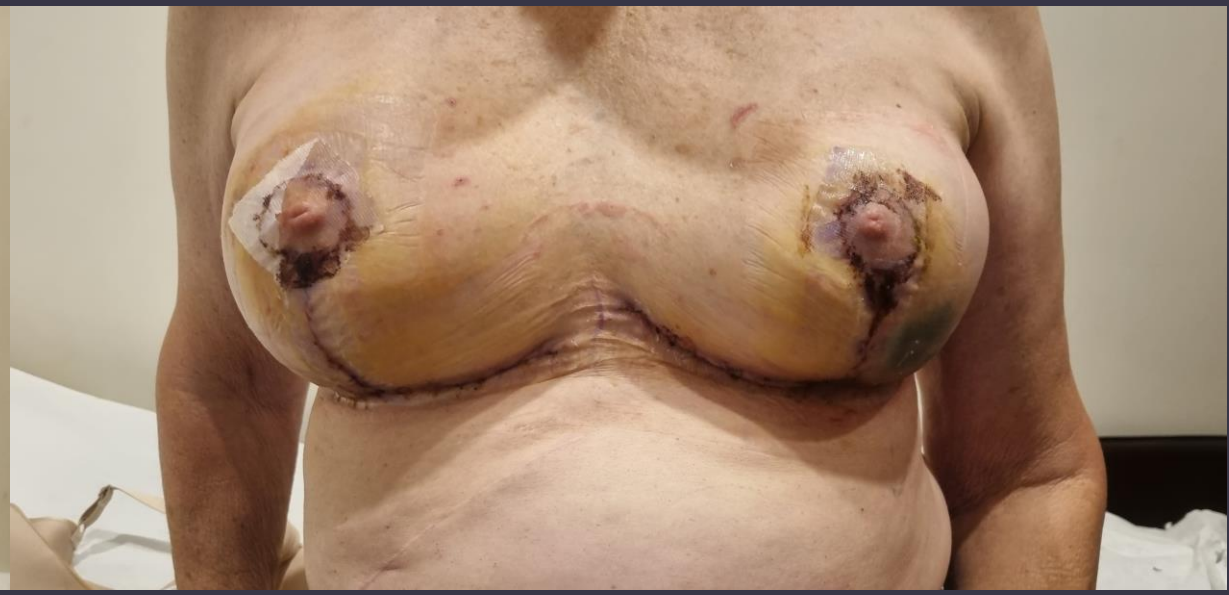


MRI – pre-op assessment



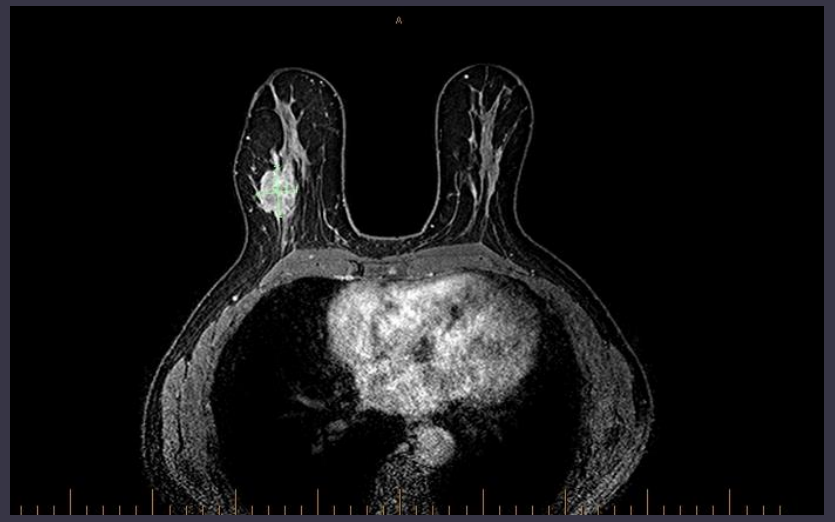


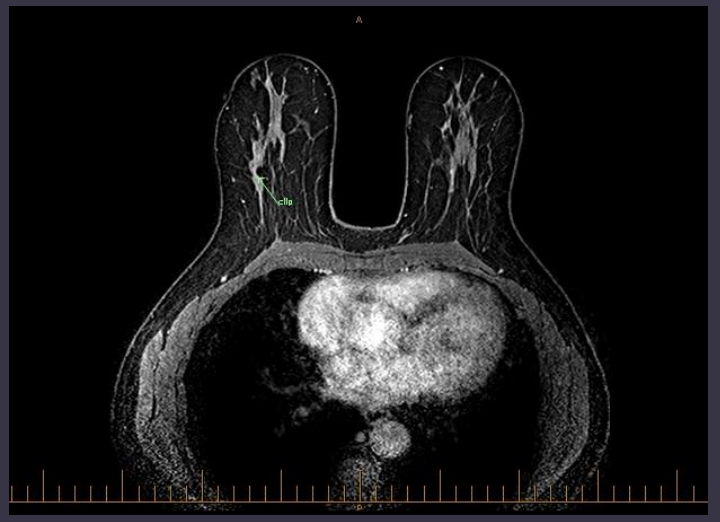




MRI – neoadjuvant chemotherapy

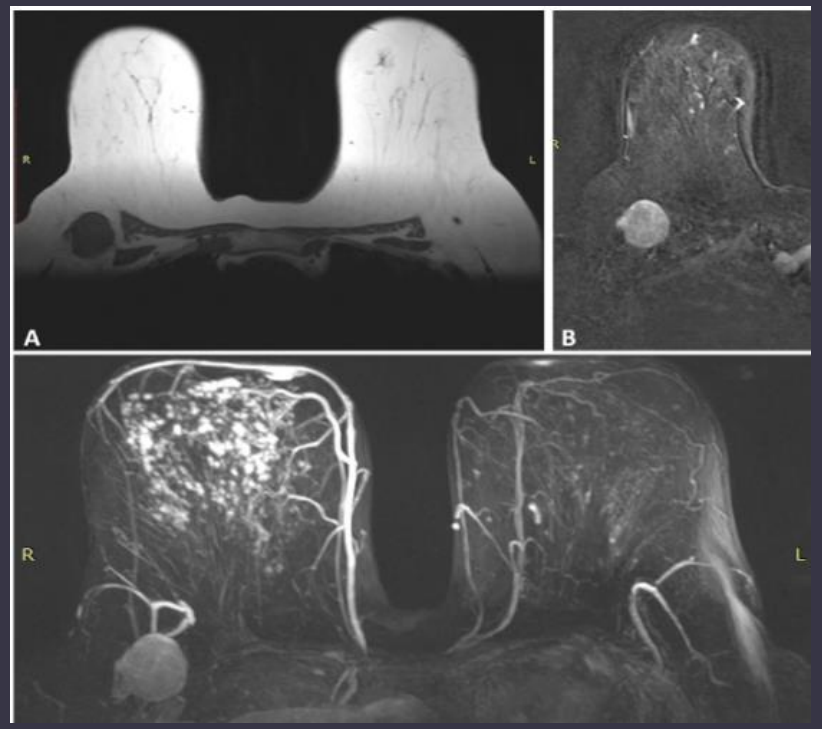
- Pre- and Post- neoadjuvant chemotherapy
  - Breast MRI is helpful in demonstrating the true tumour size initially, as well as identifying residual tumour following the completion of neoadjuvant therapy.
  - Although, MRI is limited by both over- and underestimation of residual disease, it correlates more accurately with pathologic specimens, in the range of 71% to 90%, vs. clinical exam (19% to 60% accuracy), ultrasound (35% to 75% accuracy) and mammography (26% to 70% accuracy).





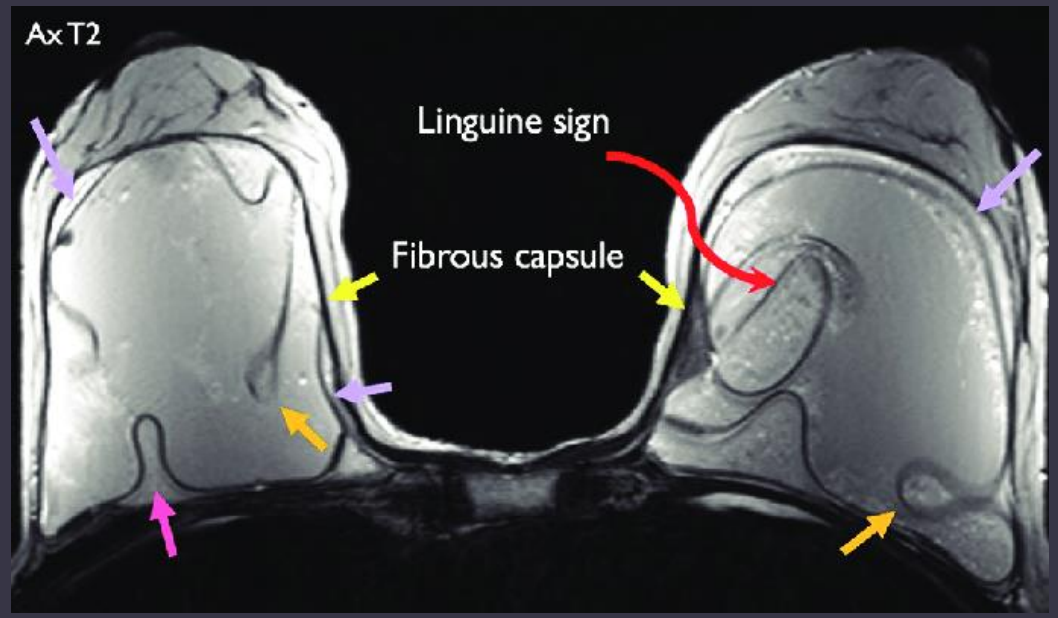
MRI – Occult primary

- Occult primary – malignant axillary lymph node
  - Patients presenting with metastatic axillary adenocarcinoma with no evidence of breast cancer on physical exam or mammography represent <1% of all breast carcinoma cases



MRI – Implant assessment

- Breast implant assessment
  - MRI is the imaging modality of choice for detecting silicone implant rupture.
  - More superior to mammography and ultrasound with the sensitivity of MRI reported to range from 78% to 100% and specificity ranging from 63% to 91%



Summary of breast screening recommendations:

Risk Category	Age	Breast Screening Recommendations
Population risk	< 40 years	No screening
	>= 40 and < 50 years	2nd yearly mammograms optional through Breastscreen
	> 50 years	2nd yearly mammograms recommended
Moderate risk	< 40 years	No screening
	>= 40 years	Annual mammograms recommended
High risk	< 25 years	No screening
	>= 25 and < 50 years *	Annual examination and screening - mammograms /MRI/US
	>= 50 years *	Annual examination and mammography - MRI not usually recommended

*Since Nov 2022, MRI rebate is now to 60