Mammograms, Ultrasounds, MRI: Who gets what and why?

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Disclosures

- None
- No conflict of interest
Breast Imaging

- Mammograms
- Breast Ultrasound (US)
- Breast MRI
- Thermography - ????
- Nuclear Medicine studies – Research
  - Mammogram using Gamma camera (MBI)
- New Emerging imaging technology
Standard screening Recommendations

- Screening starts at age 50 with Bilateral Mammogram and continues every 2 yrs: (Avg risk)
- Early screening for High Risk/family history +ve for breast cancer (ex. 10yrs earlier to date of mother with breast cancer)
- Baseline could be obtained between 40-50 yrs
Screening: women treated for breast cancer

- **Annual Mammogram**
- **Breast MR** - only if > 25% lifetime risk for breast cancer
- **Breast US** - only if eligible for MR but cannot have it

** Screening with breast Ultrasound is not recommended due to many false +ve findings, operator dependence, time consuming **
Why Screen

Diagnose recurrence as early as possible
Assess surgical site - Lumpectomy/partial mastectomy/breast conserving surgery (BCT) - Establish new normal

Assesses remainder of breast - detect lumps, calcifications, changes from previous studies

Assesses contralateral breast

May detect growing nodes in lower axilla
Mammogram post surgery

- Started after completion of BCS (>6 months after radiation completed)
- Both breast imaged annually
- In women with unilateral mastectomy, mammogram of the contra lateral breast performed annually
- If original cancer not detected on Mammogram, still screening mammogram annually is recommended
Digital Mammography

**Advantages:**
- Better in dense breasts
- Lower recall rates
- Electronic portability of films
- Less artifacts from developing films
- Less pain/discomfort (patient feedback)

**Disadvantages**
- None
**Category B:**

May be eligible for screening with annual MRI + mammography through OBSP because of history suggestive of hereditary breast cancer

**Please check at least one box:**
- First-degree relative of a mutation carrier (e.g., BRCA1, BRCA2), has not had a genetic assessment or genetic testing.
- A personal or family history (paternal or maternal) of at least one of the following:

**Please check all that apply:**
- Multiple cases of breast cancer (particularly where diagnosis occurred at \( \leq 50 \) years) and/or ovarian* cancer (any age) in the family — especially in closely related relatives\(^\dagger\), on the same side of the family.
- Primary cancer occurring in both breasts, especially if one or both cancers were diagnosed \( \leq 50 \) years.
- Both breast and ovarian* cancer in the same woman.
- Breast cancer at \( \leq 35 \) years.
- Invasive serous ovarian* cancer.
- Breast and/or ovarian* cancer in Ashkenazi Jewish families.
- An identified BRCA1 or BRCA2 mutation in any blood relative.
- Male breast cancer.

*Includes cancer of the Fallopian tubes and primary peritoneal cancer.
\(^\dagger\) Closely related relative: 1st degree = parent, sibling, child or 2nd degree = grandparent, aunt, uncle, niece, nephew
OBSP High Risk screening

Woman’s history
Note: If the woman had bilateral mastectomies either as treatment for cancer or for prevention of cancer she is not eligible for mammogram or MRI high risk screening through the OBSP.

• Date of most recent mammogram: __________ Location: __________
• Date of most recent MRI (if done): __________ Location: __________
• Previous genetics assessment for inherited breast cancer risk? Y/N Specify Centre: __________________________
OBSP HIGH RISK screening

**Category A:**
Eligible for screening with annual MRI + mammography through OBSP due to high risk criteria

Please check at least one box:
- Known to be a carrier of a deleterious gene mutation (e.g., BRCA1, BRCA2).
- First-degree relative of a mutation carrier (e.g., BRCA1, BRCA2), has previously had a genetic assessment and has currently declined genetic testing.
- Determined to be at $\geq 25\%$ lifetime risk of breast cancer (must have been assessed using IBIS or BOADICEA tools – See reverse side for definitions).
  
  IBIS: 10 year risk: ____________  Lifetime Risk: ________
  BOADICEA: 5 year risk: ____________  Lifetime Risk: ________

If results are available, fax a copy with referral form.

- Received chest radiation (not x-ray) before age 30 and at least 8 years previously (e.g., as treatment for Hodgkin’s lymphoma).
Breast MR in treated breast

- Post-op if unsuspected disease found at surgery or pathology
- If diagnosis is Invasive Lobular cancer
- Young woman < 50yrs (pre /peri- menopausal)
- Dense breast in women diagnosed with cancer
- High Grade tumors/ High risk for recurrence
So why not every women get Breast MR?
- Does not fit the bill for a screen test for general population
- High sensitivity but variable specificity
  - Sensitivity: \( > 95 \text{-} 98\% \) (for invasive cancers)
  - Specificity: 37\text{-}97\% (false +ve, non-specific findings lead to unnecessary biopsies)

- Low grade cancers such as DCIS/ADH may not be detected. MR could be false negative.
Not suitable for:

- Screening Average risk women
- As a replacement of Mammogram or Ultrasound
- To determine need for biopsy of a suspicious or indeterminate lesions detected by other tests including Mammogram, Ultrasound and Physical Exam
Ultrasound in treated breast

NO ROLE IN SCREENING FOR RECURRENT BREAST CANCER
USED AS AN ADJUNCT TO ABNORMAL FINDINGS ON

Physical exam
Mammogram
MR findings

Ultrasound focused to area of concern
Ultrasound in treated breast

- Usually Targeted to any areas of concern - ADJUNCT
  - found on clinical exam/mammogram/Breast MR

- US correlates and characterizes the abnormality found on above - cyst Vs solid...benign Vs worrisome

- Once an abnormality found - Very useful modality to biopsy using US guidance

- Screening only if Breast MR exam not possible
Thermography, Mammography, and Clinical Examination in Breast Cancer Screening

Review of 16,000 Studies

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The use of radiologic modalities in the early diagnosis of breast cancer has been the subject of much investigation. The wellspring of this interest is the clinical observation that smaller lesions with little or no axillary lymph node involvement mean significantly higher five-year survival than larger lesions with nodal metastases (6).

Mammography has been shown to detect many such early lesions which are nonpalpable even to the most experienced clinician (7, 14).

Mammographic examination of asymptomatic women, with negative physical examinations, by Witten and Trubner (19), Wolfs (18), and Stevens and Weigel (15) have yielded 1.6, 4.1, and 6.5 breast cancers per thousand women screened, respectively. In patients referred for mammography because of nonspecific symptoms with no definite clinical evidence of breast cancer, Egan detected 53 cancers in 2,000 mammographic examinations (27/1000) (5). Martin et al. found 15 clinically unsuspected cancers in 571 patients (26/1,000) (13). These lesions

Breast cancer screening detected 139 biopsy-proved malignancies in 16,000 self-selected women (8.7/1,000). In those, xeroradiography selected 78% (109), clinical examination 55% (76), and thermography 59% (54). In all 16,000 women, the thermogram was interpreted as positive in 17.9% (2,854). The greatest effectiveness of mammography vs. clinical examination was seen in detection of early breast cancers (small lesions with negative axillary lymph nodes). In this group, thermography was less effective than it was in patients with larger lesions and lymph node metastases.

INDEX TERMS: (Breast, special procedures 0[1], 129) • Breast neoplasms, diagnosis • Mammography • Thermography • Xeroradiography


Fig. 1. Detection of 139 biopsy-proved breast cancers on initial examination. At mammography alone, 45% (63 patients), C: clinical examination alone; 21% (30 patients), C,M: both clinical examination and mammography, 33% (40 women).
Thermography

- Not a breast cancer screening test
- Not validated for breast screening
- Produces images generated by heat. It is non specific.
- Usually only identifies large cancers that are felt clinically

Do not use thermography for breast cancer screening: Health Canada

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New Technology

- Tomosynthesis: Extension of Mammography (3D)
- Automated Breast Ultrasound systems (3D)
Multidisciplinary Breast team

- Family physician
- Radiologist
- Pathologist
- Surgeon
- Radiation/Medical oncologist
- Support group
References


BRIGHT RUN
We are Awaiting

Thank you !!

CIBC Breast cancer assessment Centre: 2014