

Breast Cancer Screening and High Risk



Mary Freyvogel, DO

Breast Surgeon

Clinical Assistant Professor of Surgery

University Hospitals Case Medical Center

St. John Medical Center / Elyria Medical Center



Objectives



1. Current breast screening recommendations

2. Breast density

- What does it mean?
- Recent notification law
- Do we approach these patients differently?

3. Breast cancer risk

- Who is at risk?
- How do we counsel/screen high risk women?
- UH High Risk Clinic

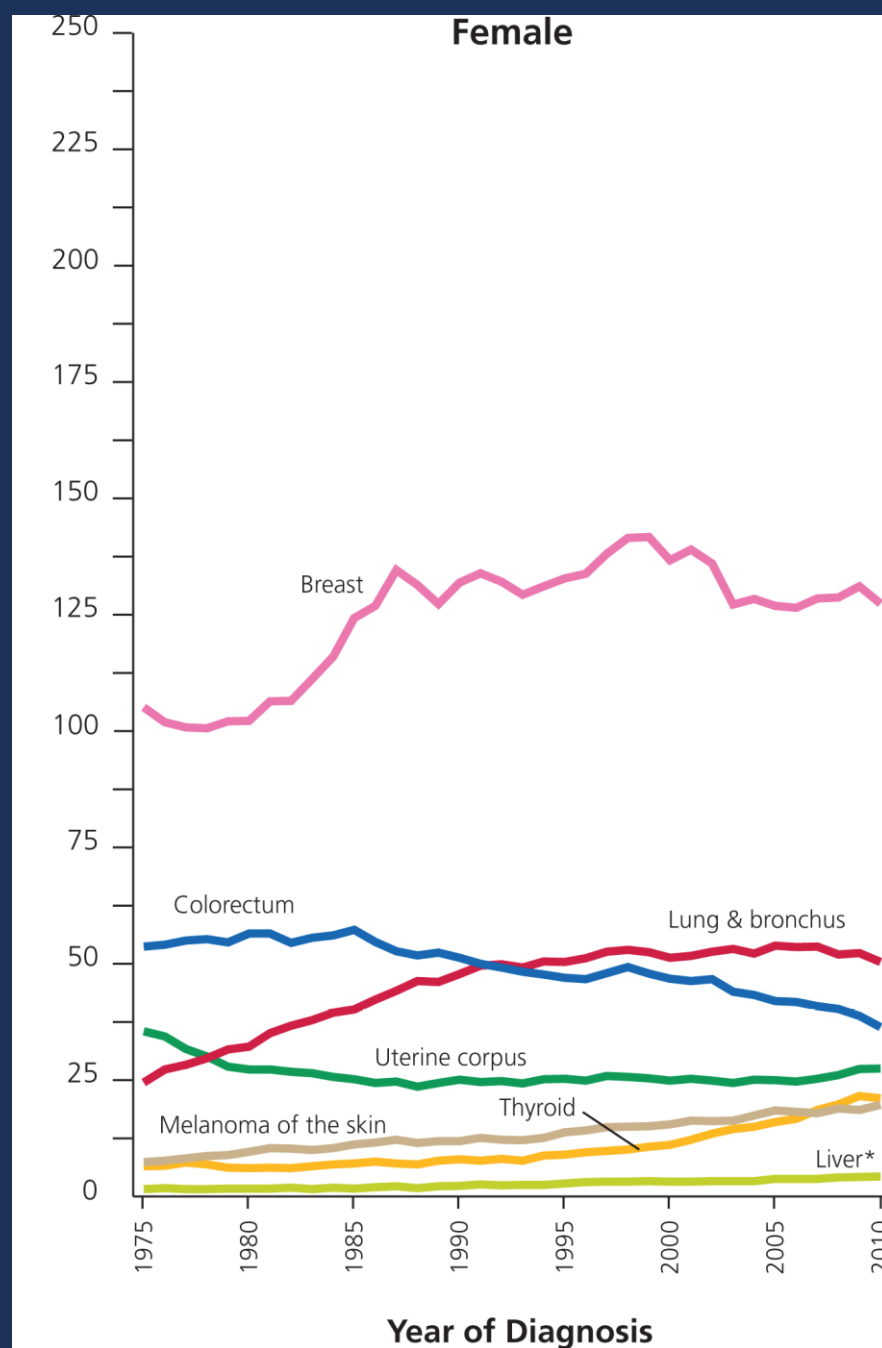
Current Breast Screening Recommendations



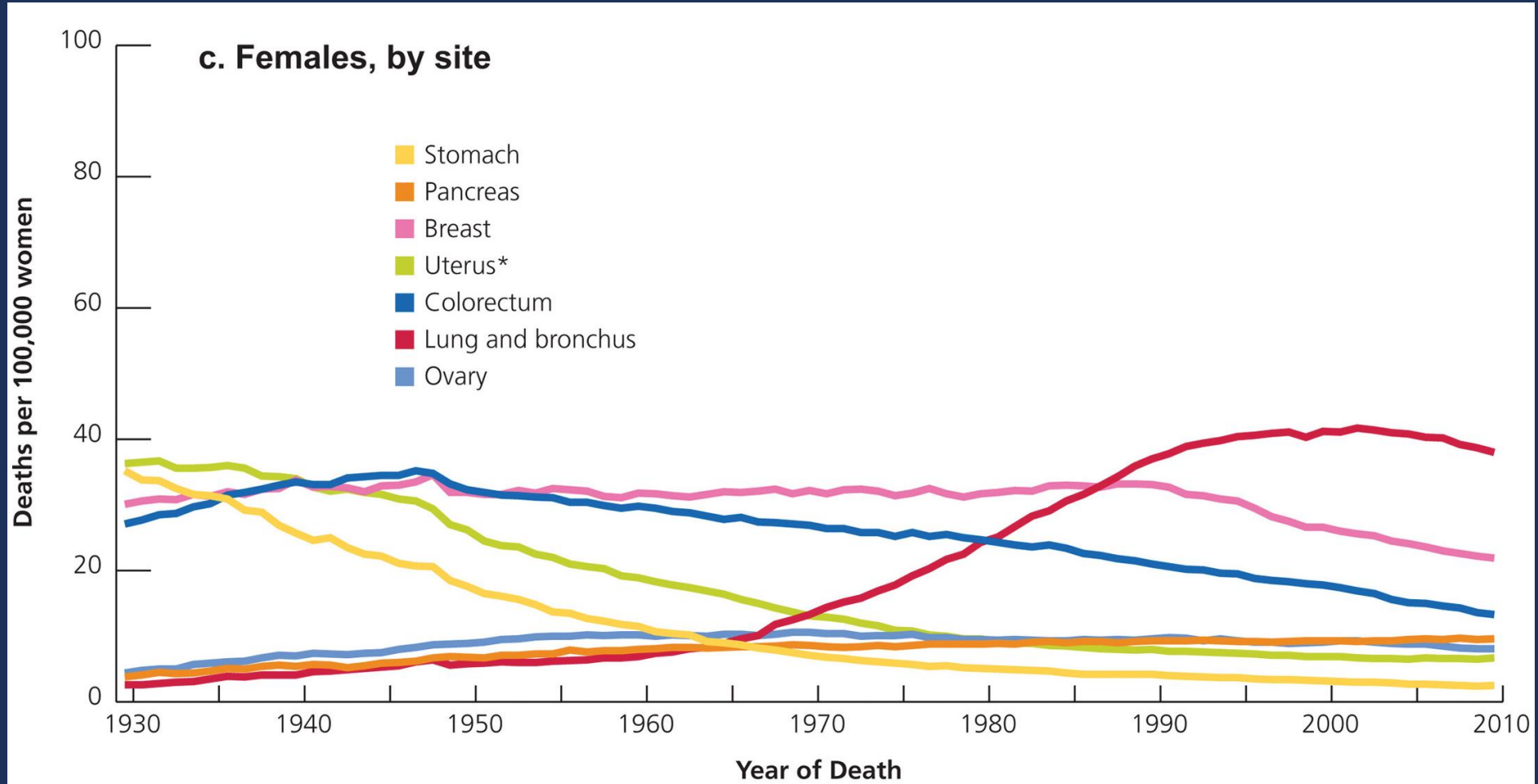
- 1 in 8 women will develop breast cancer
- Average lifetime risk 12-15%
- 75% of women with breast cancer will have no family history
- 2014 → 232,670 women diagnosed with breast cancer (#1 – 29%)
 - 40,000 deaths (2nd leading cause of cancer death in women)
 - leading cause of cancer death in women ages 35 – 54 yr.

Incidence

- Invasive breast cancer incidence increased ~1-2% every year from 1940 – 1980.
- Large increase in 1980's – result of increase in screen detected cancers (DCIS).
- The institution of widespread screening mammography in the US caused a change in national statistics.



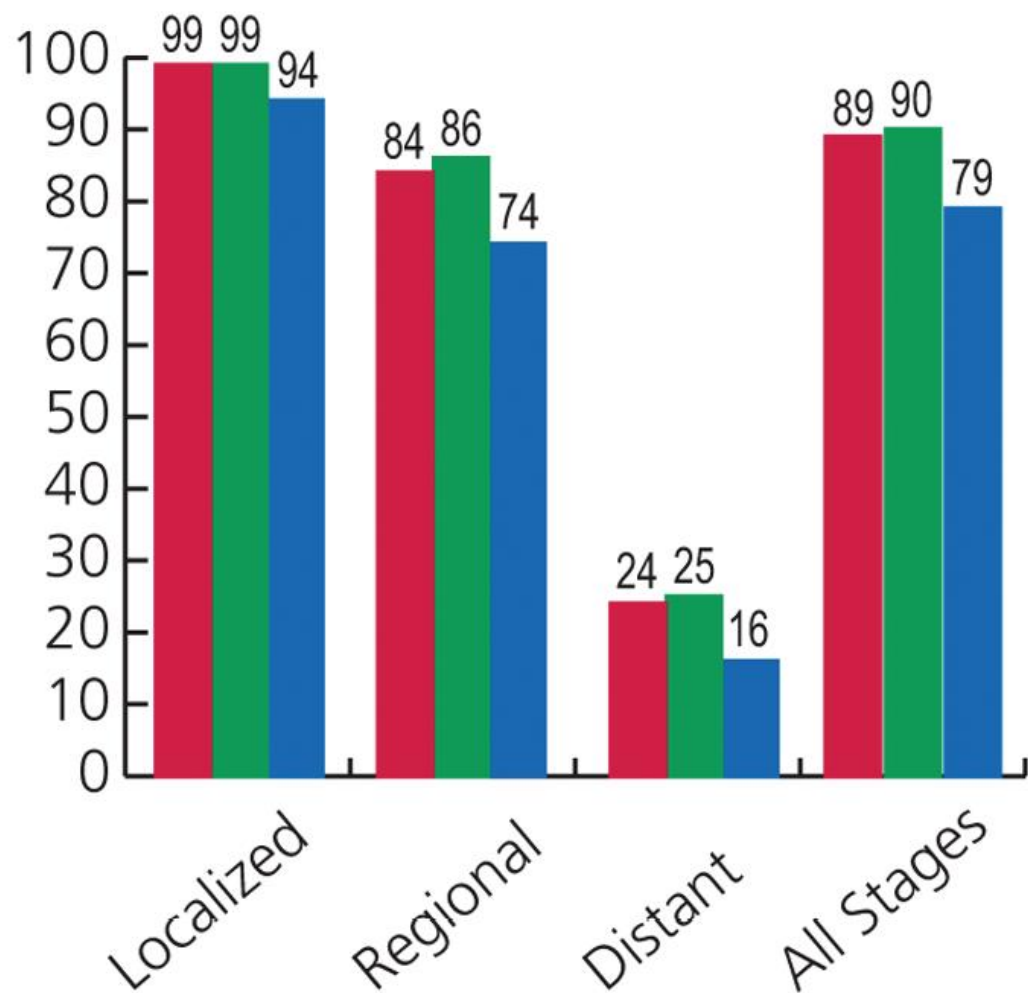
Mortality



- Unchanged death rate from 1940 – 1990.
- Sudden decline with a drop of 25% by 2005.

Cancer Statistics, 2014. CA Cancer J Clin 2014; 64: 9-29.

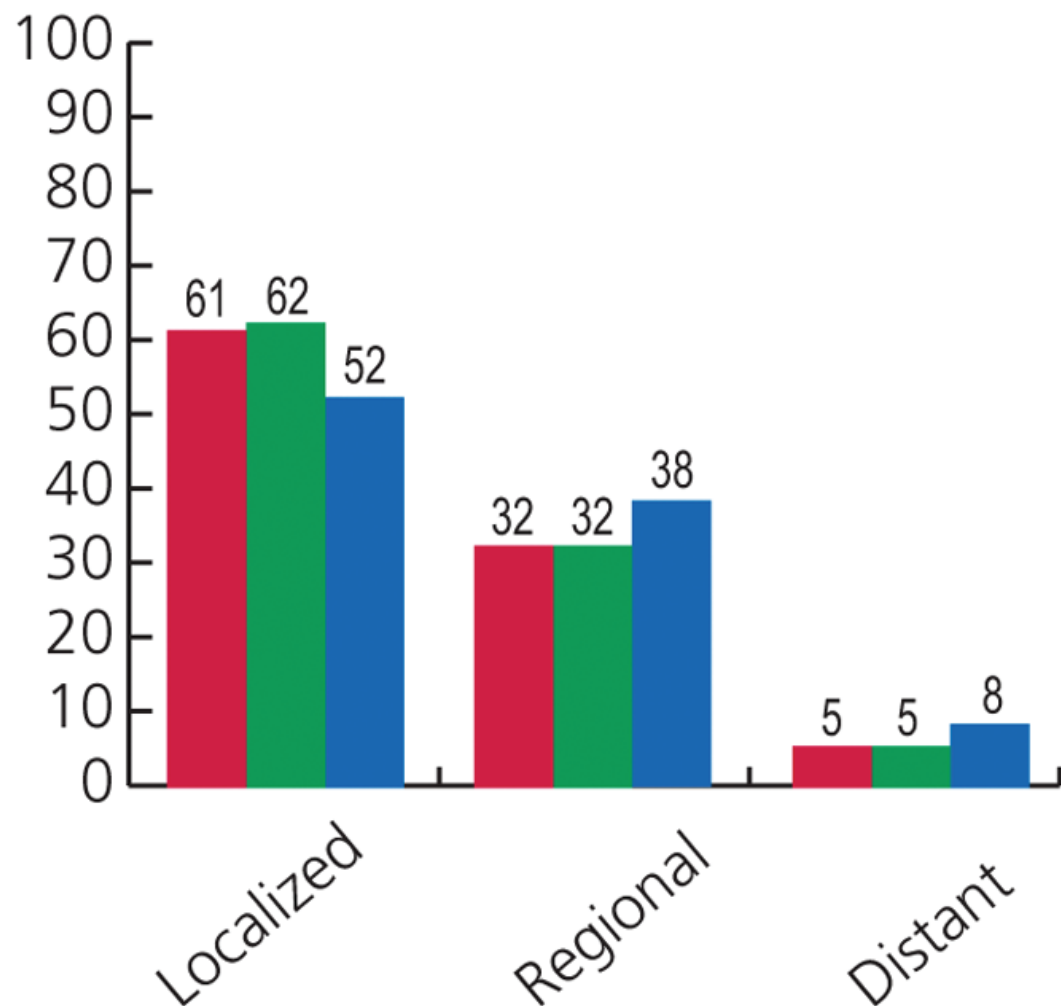
Female breast



Five-Year Relative Survival Rates by Race and Stage at Diagnosis, United States, 2003 to 2009.

■ All Races
■ White
■ African American

Female breast



Cancer Statistics, 2014. CA Cancer J Clin 2014; 64: 9-29.

Stage Distribution of Selected Cancers by Race, United States, 2003 to 2009.

- All Races
- White
- African American



Early detection saves lives

Current Breast Screening Recommendations

The American Cancer Society



- Yearly mammograms starting at age 40 and continuing for as long as a woman is in good health.
- Clinical breast exam (CBE) every 3 years for women in their 20s and 30s and every year for women 40 and over.
- Breast self-exam (BSE) is an option for women starting in their 20s.
- Some women should be screened with MRI in addition to mammograms (lifetime risk > 20%).

What about the Task Force guidelines?

United States Preventative Services Task Force, 11/2009?



- Biennial mammogram in women 50-74.
- Biennial screening in women <50 should be an individual decision.
- Insufficient evidence to support screening in women >75.
- Recommend against self breast exam.
- Insufficient evidence for clinical breast exam
- Insufficient evidence for digital mammography and MRI vs film-screen mammography.

What about the Task Force guidelines?

United States Preventative Services Task Force, 11/2009?

- Federally funded committee that does not include a radiologist, oncologist, breast surgeon or any breast cancer specialist.
- Cost-cutting measure
- Screening every other year would miss 19-33% of screen detected cancers.
- Women 40-49 tend to have more aggressive, deadlier cancers.
 - leading cause of cancer death in women ages 35 – 54 yr.
- Screen detected cancers in women aged 40-49 present at earlier stages → less likely to need chemotherapy and extensive surgery.



~~USPSTF~~

Mammography



- Limitations:
 - Overlapping breast tissue with need for callbacks / additional views
 - Unnecessary biopsies
 - Dense breasts can obscure cancer
 - Up to 50% of women have dense breast tissue

Breast Density



- Cannot be determined by physical exam and is unrelated to breast size or consistency.
- Determined mammographically and assigned by the radiologist.
 - Qualitative, visual assessment
- Ratio of fat to fibroglandular tissue in the breast.

Breast Density Notification Law

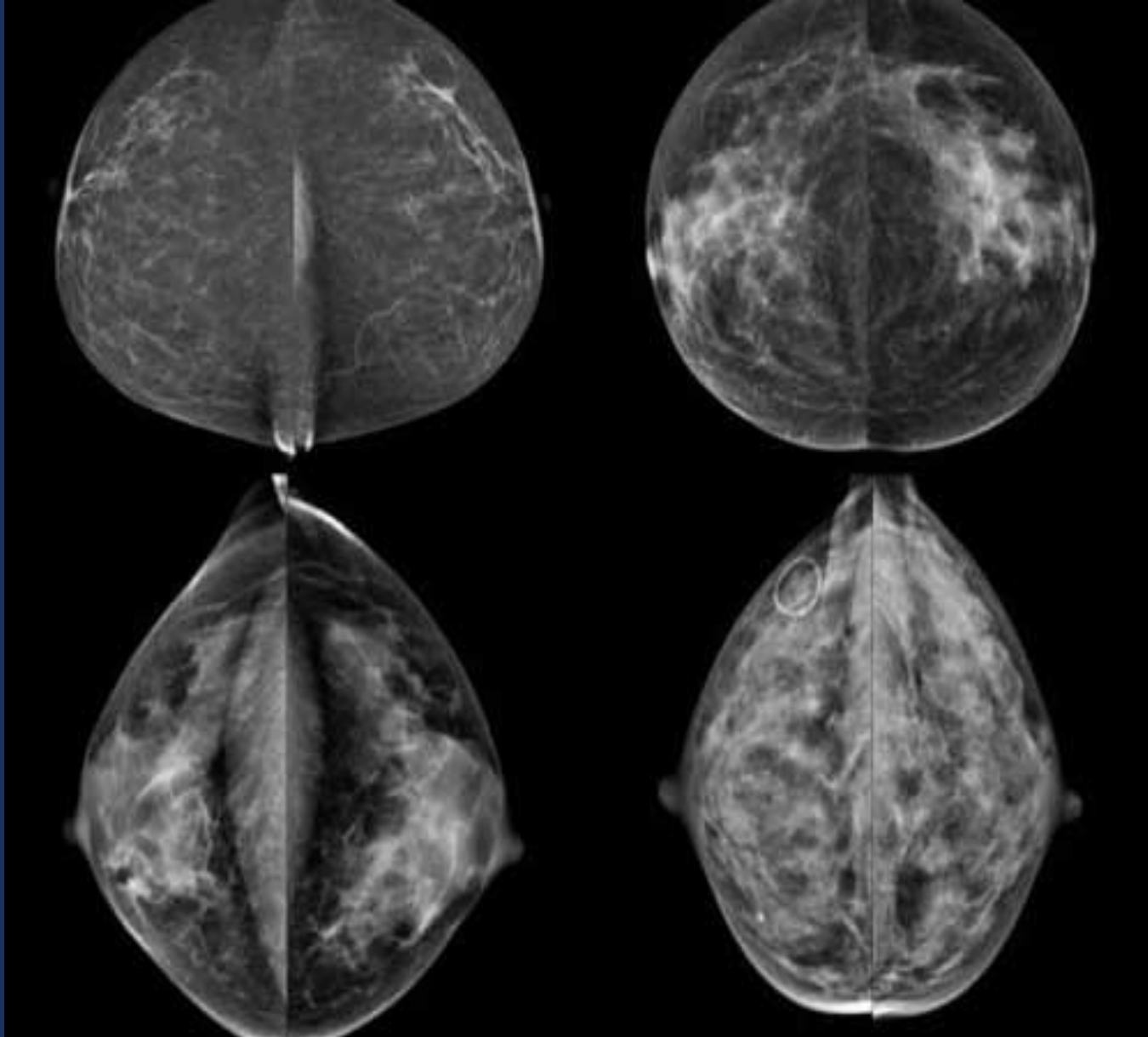


- In December, Ohio was the 20th state to pass a breast density notification law: SB54
- Requires hospitals and clinics that perform screening mammography to notify the patient that she has dense breast tissue.
- Notification will start in March

Breast Density Notification Law



- “ Your mammogram demonstrates that you have dense breast tissue, which could hide abnormalities. Dense breast tissue, in and of itself, is a relatively common condition. Therefore, this information is not provided to cause undue concern; rather, it is to raise your awareness and promote discussion with your health care provider regarding the presence of dense breast tissue in addition to other risk factors. ”



- 4 categories:
 1. Fatty (10%)
 2. Scattered fibroglandular density (40%)
 3. Heterogeneously dense (40%)
 4. Extremely dense (10%)
- Women in categories 3 or 4 will be informed that they have “dense breasts”.

Breast Density Implications



1. Effect on mammographic sensitivity

- Masking - dense breast tissue and cancer both appear white.
- Sensitivity is diminished 10-20% in dense breasts.
- Mammogram can miss up to 50% of cancers in dense breasts
- Additional screening modalities available: US, Tomosynthesis, MRI
 - NOT a replacement!

Breast Density Implications



2. Increased risk of breast cancer

- Avg risk of breast cancer in next 10 years:
 - Age 30: 0.44% (1 in 227)
 - Age 40: 1.47% (1 in 68)
 - Age 50: 2.38% (1 in 42)
 - Age 60: 3.56% (1 in 28)
 - Age 70: 3.82% (1 in 26)
 - The risk for the 40% of women with heterogeneously dense breasts is ~1.2x higher.
 - The risk for the 10% with extremely dense breasts is ~2x higher.
- Breast density is **not** a major risk factor.

Breast Density

- Factors associated with decreased density
 - Increased age / post-menopausal status
 - Vit D and Calcium intake in pre-menopausal women
 - Cessation of HRT
 - SERMs (Tamoxifen, Raloxifene)
 - Increased BMI



Breast Density

- Factors associated with increased density
 - Nulliparity
 - Late age at first birth
 - HRT
 - High intake of Vit C, E, B12
 - Elevated plasma lipids
 - Lactation and pregnancy



Additional imaging options for dense breasts



- Tomosynthesis
- Ultrasound
 - Handheld screening ultrasound
 - Automated whole breast ultrasound
- MRI
- Nuclear techniques

Tomosynthesis



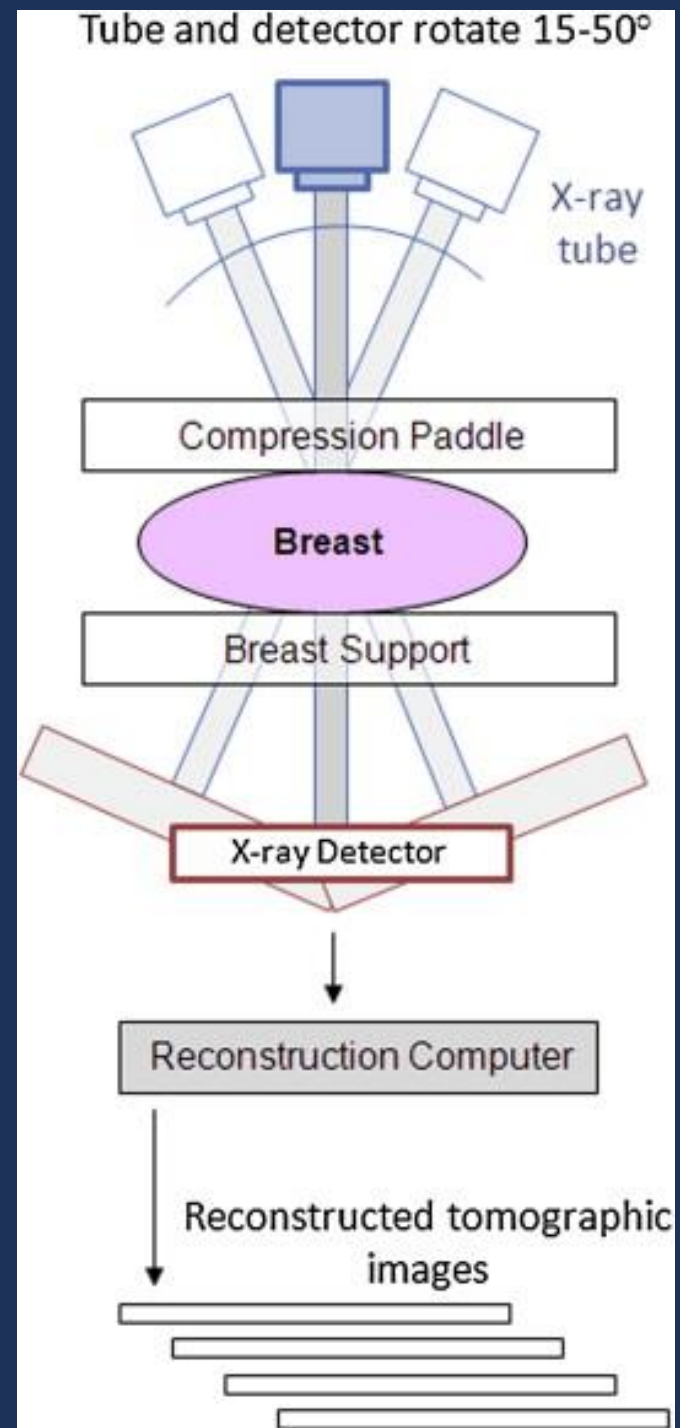
- ' 3-D mammography '
- Decreases tissue superimposition of overlapping structures
 - Limitation of 2-D mammography
- Overlapping tissue leads to 10% callbacks
 - Majority of callbacks have no underlying abnormality.

Tomosynthesis

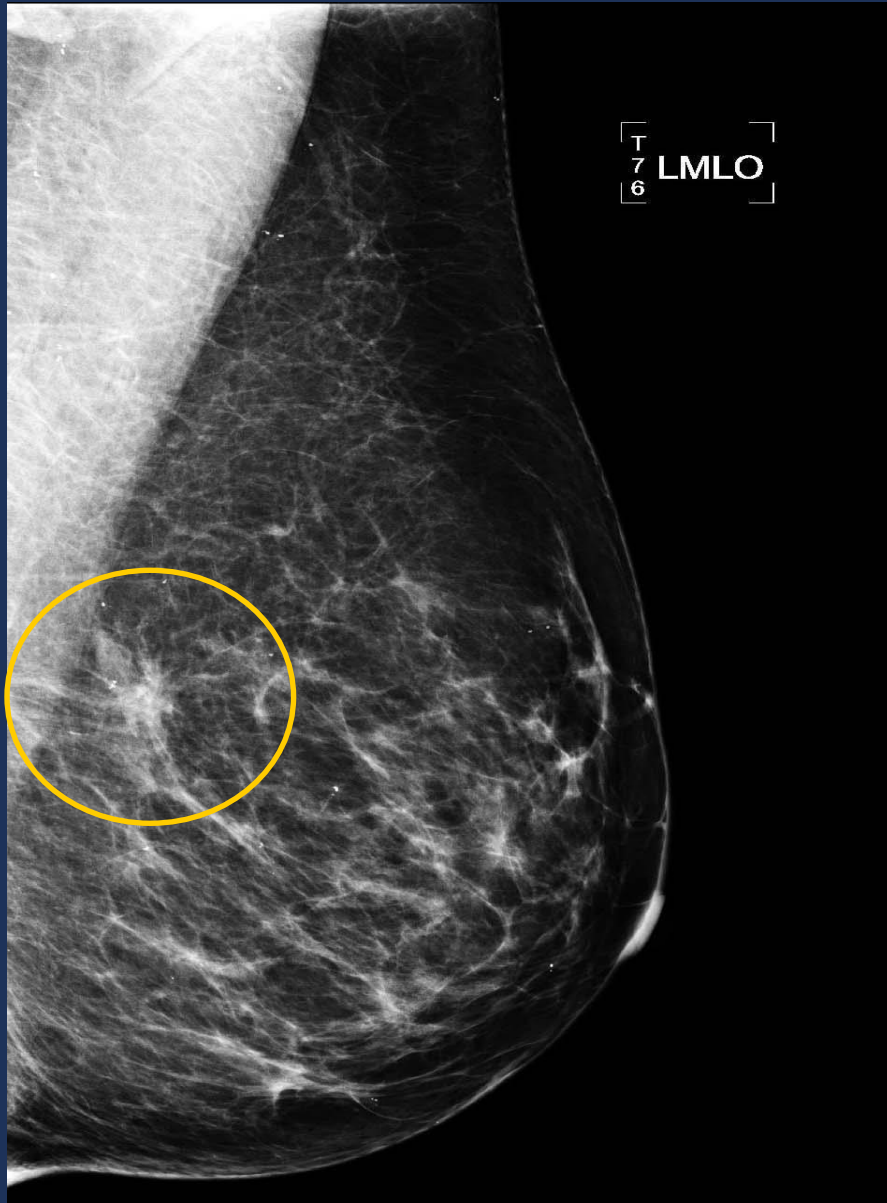
- Mechanism:
 - X-ray tube moves in an arc across the breast.
 - Several low dose images are taken at different angles and reconstructed into 1mm slices for a 3D image.
 - Same radiation exposure as a 2D mammogram.
 - Less pressure is applied to the breast vs mammogram.
 - More comfortable for the patient



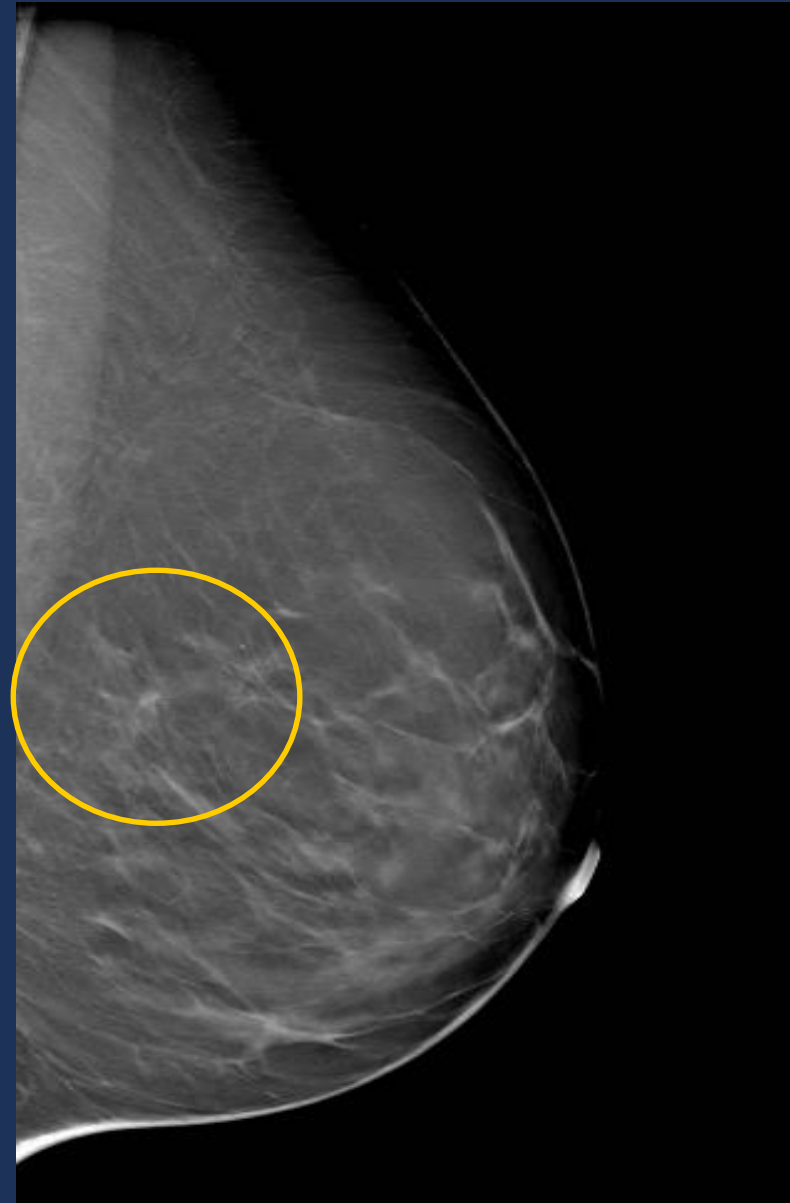
Tomosynthesis



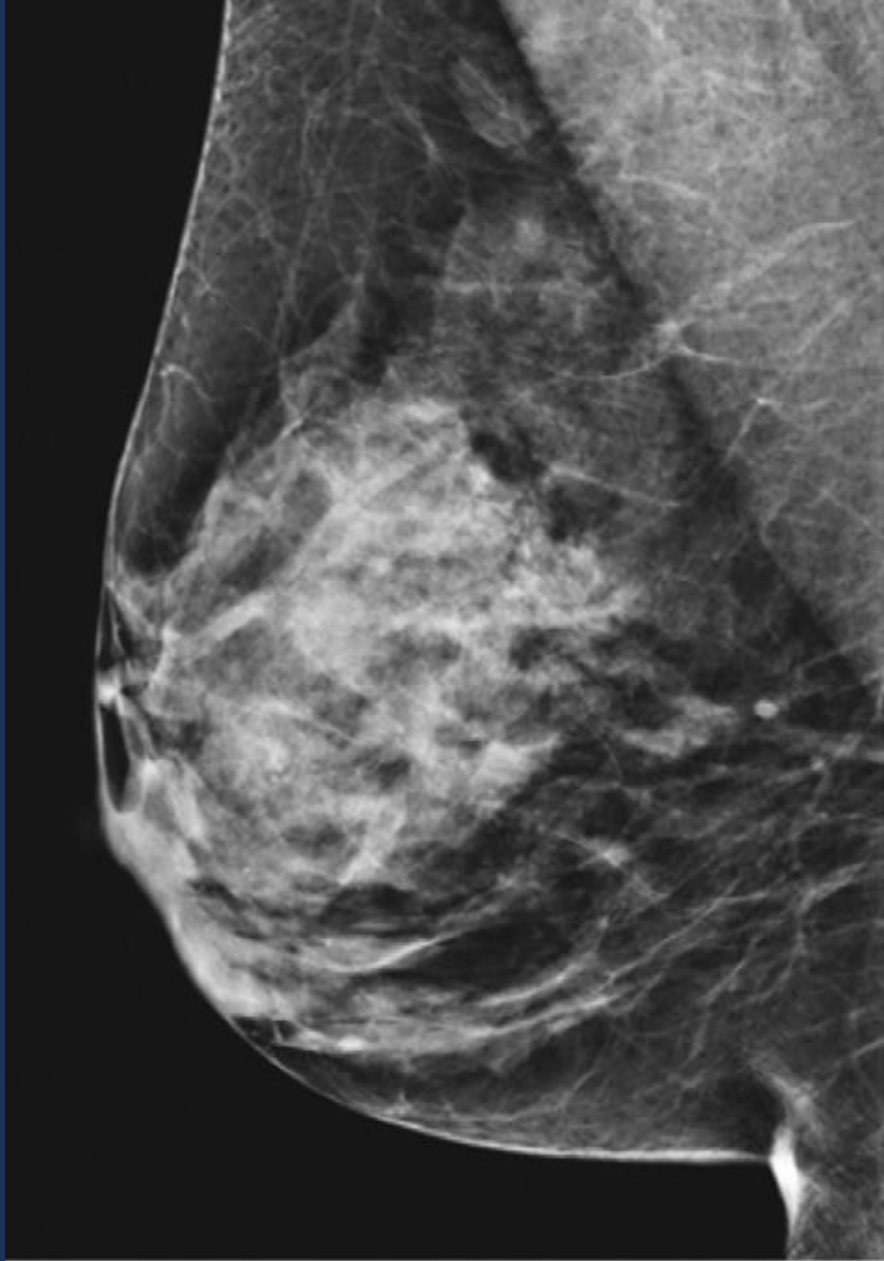
2D mammogram



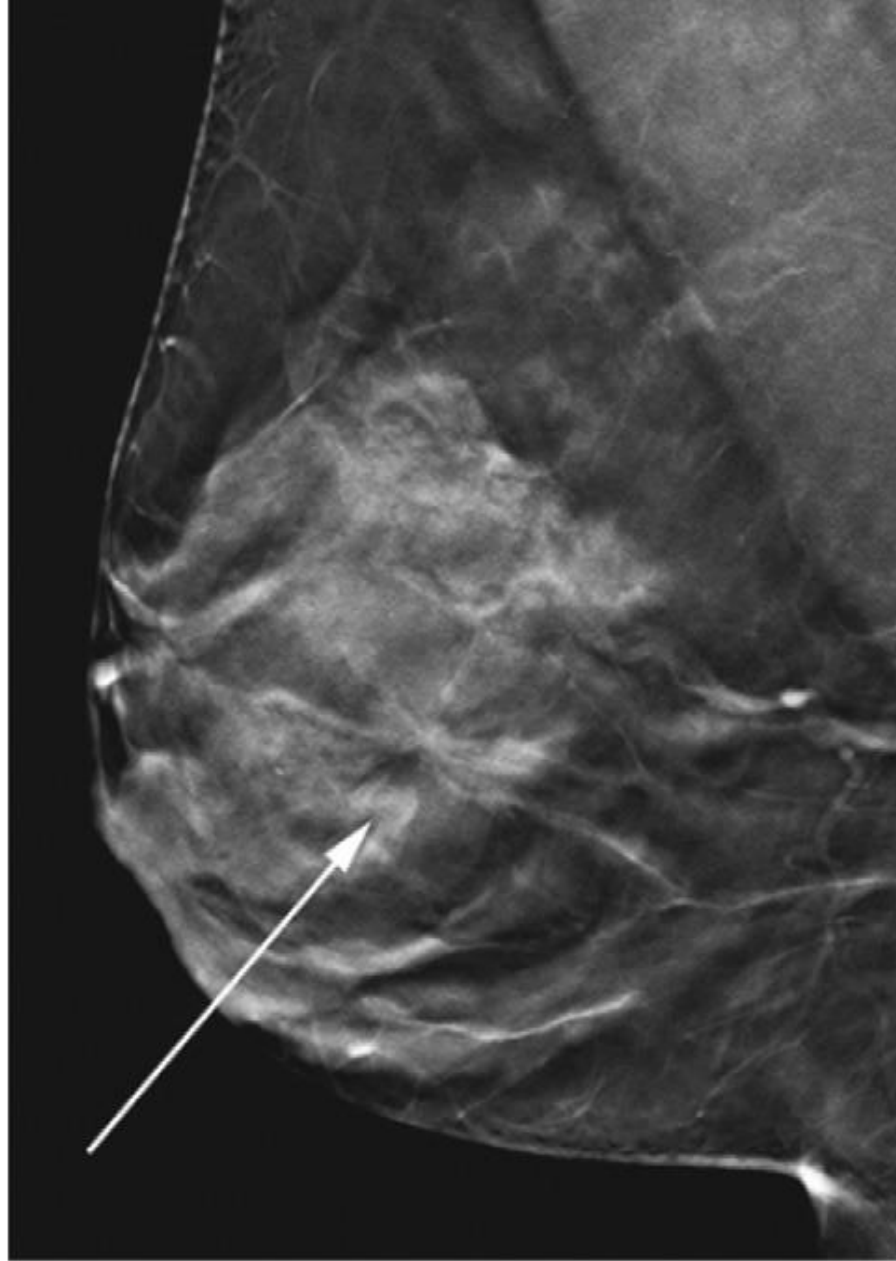
Tomosynthesis



2D mammogram



Tomosynthesis



Tomosynthesis



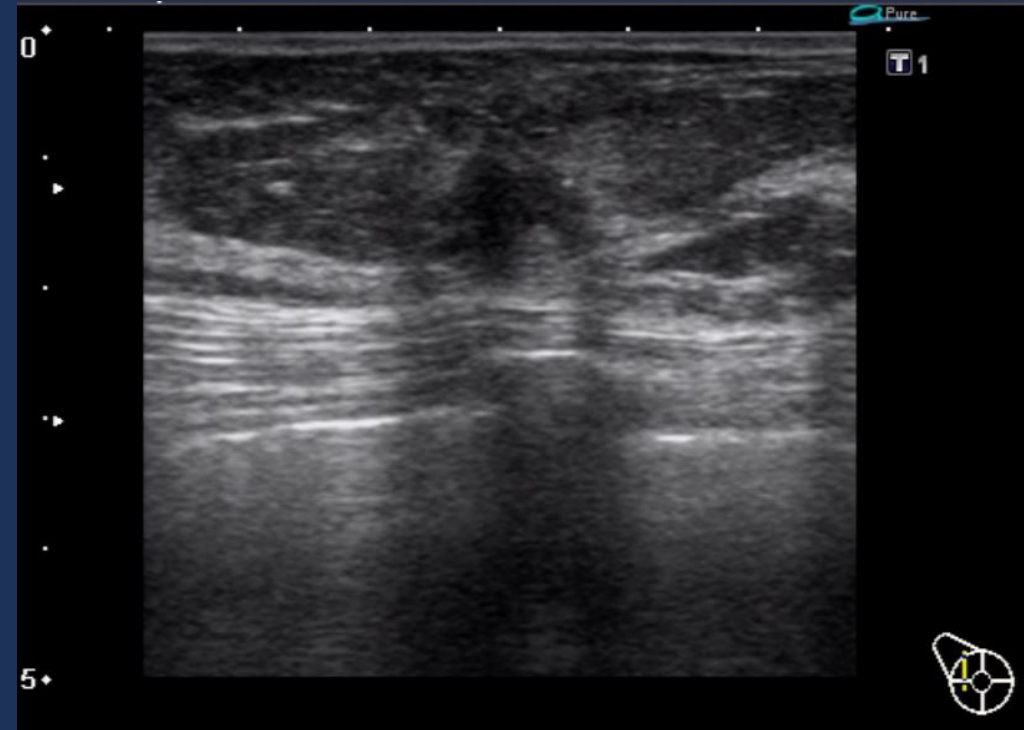
Advantages / Disadvantages:

- Reduced callbacks (15%) when added to standard mammogram
- Increased cancer detection (40%)
- Higher sensitivity for spiculated masses and architectural distortion
- Larger number of images. Potentially longer reading time.
- The combination of tomo + 2D mammogram may result in 2x the radiation.
- The ability to reconstruct 2D images from the 3D data could eliminate this concern.

Ultrasound

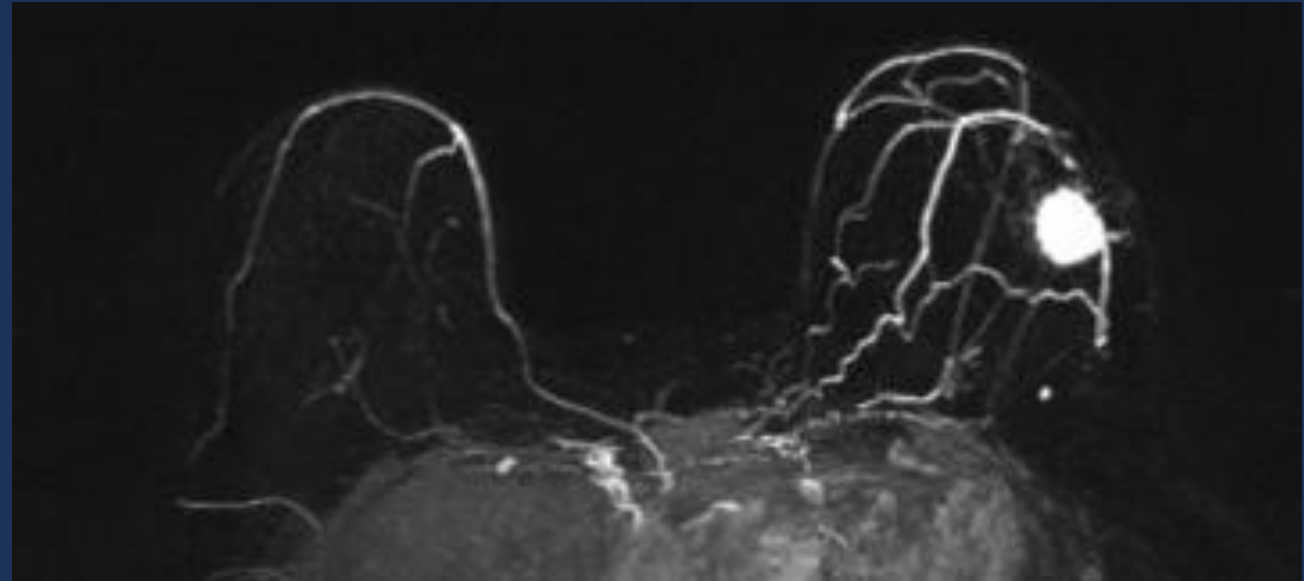


- Used most often in the diagnostic setting for mammographic or palpable abnormalities
- Not affected by breast density
- No radiation
- Screening ultrasound
 - Shown to detect an additional 3 cancers / 1000 women
 - Low PPV → many benign biopsies
 - No standard screening recommendation



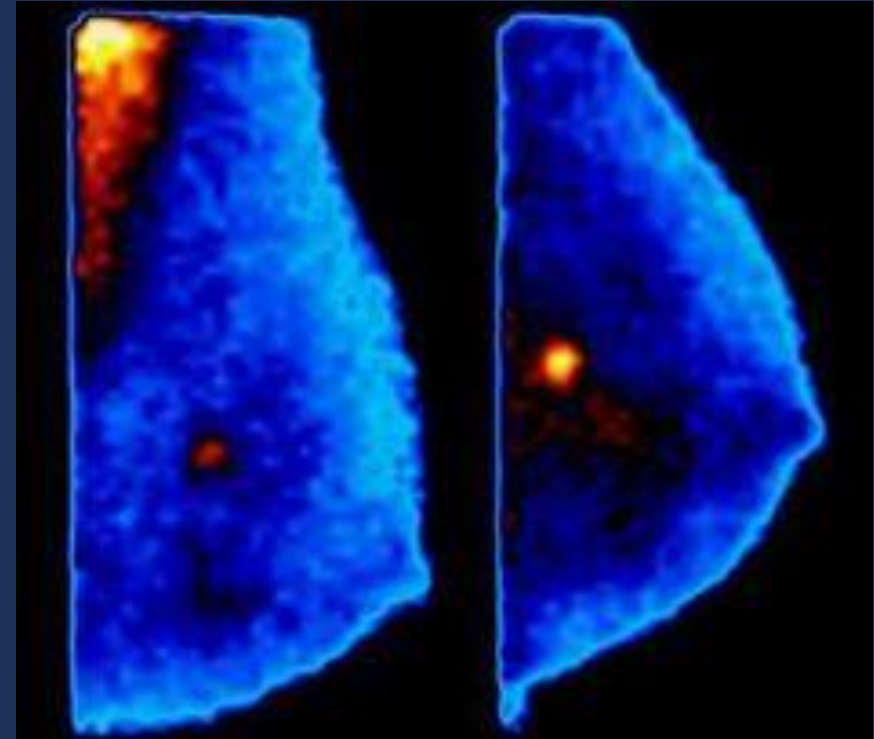
MRI

- Used in the diagnostic setting
- Used for screening high risk women (lifetime risk >20%)
- Very high sensitivity (95=99%) and NPV (99%)
- Low PPV → many benign biopsies
- Time consuming
- Expensive
- Overestimate tumor size



Nuclear Techniques

- Not widely available
- Molecular breast imaging
 - Uses radioactive tracer
 - Good specificity/sensitivity comparable to MRI
 - Not affected by breast density
 - Radiation doses too high for screening purposes



Breast Cancer Risk

- Age >50
- Personal or family history of breast/ovarian cancer
- Race
 - Pre-menopausal African American women
- Estrogen exposure
 - Early menarche
 - Nulliparity
 - Late child-bearing
 - Late menopause
 - HRT after menopause



Breast Cancer Risk

- Genetic predisposition – BRCA1 and BRCA2
- Lifestyle
 - Obesity / lack of exercise
 - Alcohol
- High Risk lesions
 - LCIS, ADH, ALH, FEA
- High breast density



Breast Cancer Risk



1. Gail Model Risk Assessment

<http://www.cancer.gov/bcrisktool>

Risk Calculator

(Click a question number for a brief explanation, or [read all explanations.](#))

1. Does the woman have a medical history of any breast cancer or of ductal carcinoma in situ (DCIS) or lobular carcinoma in situ (LCIS)? Select ▼
2. What is the woman's age?
This tool only calculates risk for women 35 years of age or older. Select ▼
3. What was the woman's age at the time of her first menstrual period? Select ▼
4. What was the woman's age at the time of her first live birth of a child? Select ▼
5. How many of the woman's first-degree relatives - mother, sisters, daughters - have had breast cancer? Select ▼
6. Has the woman ever had a breast biopsy? Select ▼
 - 6a. How many breast biopsies (positive or negative) has the woman had? Select ▼
 - 6b. Has the woman had at least one breast biopsy with atypical hyperplasia? Select ▼
7. What is the woman's race/ethnicity? Select ▼

Calculate Risk >

5 Year Risk of Developing Breast Cancer

- > This woman (age 54): 2.2%
- > Average woman (age 54): 1.4%

Explanation

Based on the information provided (see below), the woman's estimated risk for developing invasive breast cancer over the next 5 years is 2.2% compared to a risk of 1.4% for a woman of the same age and race/ethnicity from the general U.S. population. This calculation also means that the woman's risk of NOT getting breast cancer over the next 5 years is 97.8%.

Lifetime Risk of Developing Breast Cancer

- > This woman (to age 90): 15.8%
- > Average woman (to age 90): 10.4%

Explanation

Based on the information provided (see below), the woman's estimated risk for developing invasive breast cancer over her lifetime (to age 90) is 15.8% compared to a risk of 10.4% for a woman of the same age and race/ethnicity from the general U.S. population.

Breast Cancer Risk

2. Tyrer Cuzick Risk Calculator 6.0

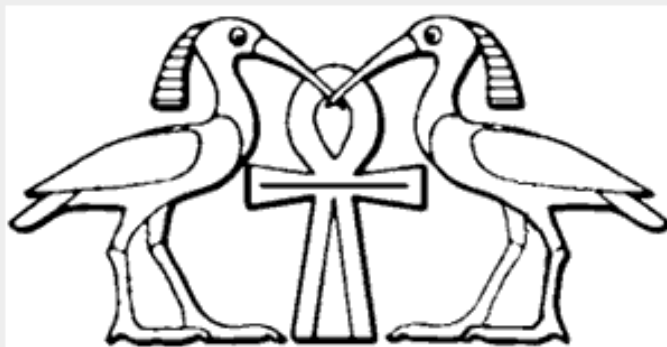
www.ems-trials.org/riskevaluator



IBIS Breast Cancer Risk Evaluation Tool

[Description](#)[Software Downloads](#)[Documentation](#)[Screenshots & Examples](#)[Software Change Log](#)[FAQs](#)

NEW! Version 7 released [[Download ZIP](#)]



Description of breast cancer risk program

The program assumes that there is a gene predisposing to breast cancer in addition to the BRCA genes. The woman's family history is used to calculate the likelihood of her carrying an adverse gene, which in turn affects her likelihood of developing breast cancer. The risks of developing breast cancer for the general population were taken from data on the first breast cancer diagnosis (ICD-10 code C50) in Thames Cancer Registry area (UK) between 2005-2009.

The risk from family history (caused by the adverse genes) is modelled to fit the results in "Familial Breast and Ovarian Cancer: A Swedish Population-based Register Study, Anderson H et al., American Journal of Epidemiology 2000, 152: 1154-1163".

Contact Details

Prof. Jack Cuzick
Centre for Cancer Prevention,
Wolfson Institute of Preventive Medicine,
Charterhouse Square,
London
EC1M 6BQ

email: riskevaluator@ems-trials.org



Software download

The current version of the software is 7. Version 6 is still available to download because it has been used in earlier studies. Changes in version 7 are described in the change log.

This tool is provided for research purposes only and no responsibility is accepted for clinical decisions arising from its use. Commercial use requires a license, for further information contact [Natasha Tian](#)

Current version

**Windows - v7 (latest
version 7.02 released
13/June/2013)**

[IBIS_RiskEvaluator_v7.zip](#)



Previous versions

**Windows - v6 (released
August 2004)**

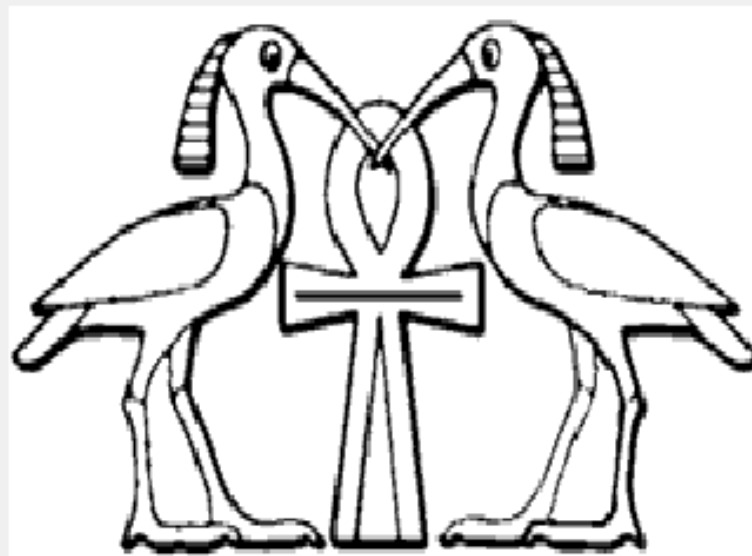
[IBIS Risk Evaluator.zip](#)



[Example.txt](#)



Version 6.0.0



IBIS Breast Cancer Risk Evaluation Tool
Developed by
Jonathan Tyrer & Jack Cuzick

CR-UK Dept. of Epidemiology, Mathematics & Statistics
Wolfson Institute of Preventative Medicine
CharterHouse Square
London EC1M 6BQ

email:

Jack.Cuzick@cancer.org.uk

Help

Presentation

Evaluate

☐ Start from
evaluation
screen



Personal factors

 Woman's age: Menarche:
Nulliparous: ☐Parous: ☒Unknown: ☐Age First Child: Hyperplasia
(without
atypia): ☐Atypical
hyperplasia: ☐LCIS: ☐Ovarian
cancer: ☐
 Height: ft. in. stone: lb.

Measurements

Metric: ☐Imperial: ☒Premenopausal: ☒Perimenopausal: ☐Postmenopausal: ☐No information: ☐Age at
menopause:
Patient
id: Patient
no.:

Calculate Risk

View Family History

HRT use
Length of
use (years):Never: ☒5 or more
years ago: ☐Less than 5
years ago: ☐Current
user: ☐Ovarian: ☐Bilateral: ☐

Mother:

Breast
cancer: ☒Age: Ovarian: ☐Bilateral: ☐

Number:

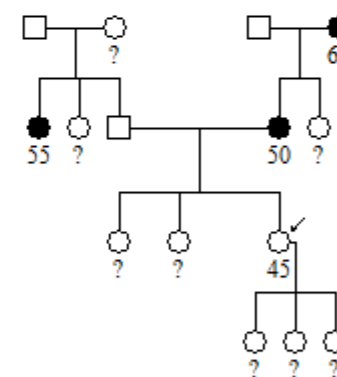
Sisters: Breast
cancer: ☐Age:
Ashkenazi
inheritance: ☐

Half Sisters

Affected cousins

Affected Nieces

Genetic Testing

Paternal
Gran:Ovarian: ☐Breast
cancer: ☐Age:
Maternal
Gran:Ovarian: ☐Breast
cancer: ☒Age: Show start
up screenPaternal
aunts:

Number:

Ovarian: ☐Breast
cancer: ☒Age:
Maternal
aunts:

Number:

Ovarian: ☐Breast
cancer: ☐Age:

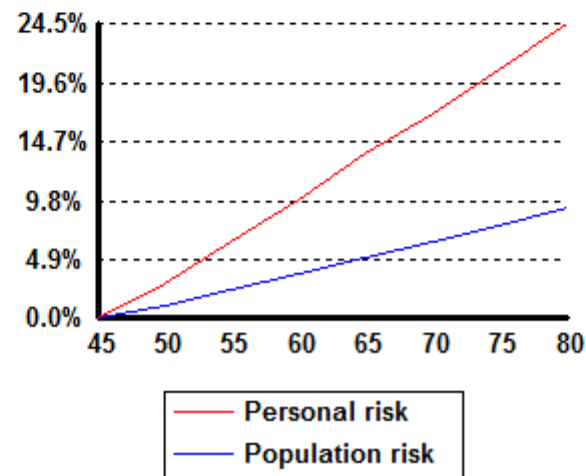
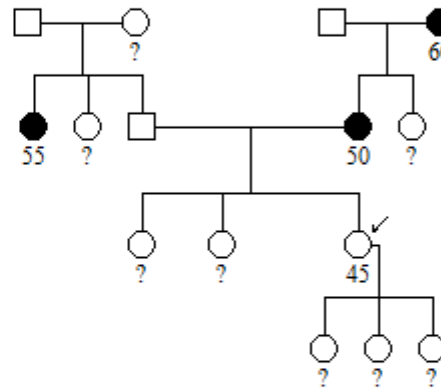
Daughters:

Number:

Ovarian: ☐Breast
cancer: ☐Age:


Woman's age is 45 years.
Age at menarche was 15 years.
Age at first birth was 30 years.
Person is premenopausal.
Height is 5 ft 4 ins.
Weight is unknown.
Woman has never used HRT.

Risk after 10 years is 6.209%.
10 year population risk is 2.226%.
Lifetime risk is 24.41%.
Lifetime population risk is 9.159%.
Probability of a BRCA1 gene is 0.103%.
Probability of a BRCA2 gene is 0.834%.



Referral Criteria: High-Risk Patients



- High-Risk Clinic
 - Relative with breast cancer or any other cancer < age 50
 - BRCA1 or BRCA2 carrier
 - Concerned about risk in general
 - Dense breasts
 - History of high risk lesion on biopsy (LCIS, ADH, ALH)

Referral Criteria: High-Risk Patients



- Genetics Clinic

- First degree relative with breast or ovarian cancer < age 45
- Personal history of triple negative breast cancer < age 60
- Multiple relatives on same side of family with breast cancer < age 50
- Male relative with breast cancer
- Family member with BRCA1 or BRCA2
- Ashkenazi Jewish descent

Seidman Cancer Center High Risk Clinic



Center for Breast Cancer Prevention (CBCP)

216-844-BRST (2778)

Breen Breast Health Pavilion

UH Chagrin Highlands Breast Health Center

UH St. John Medical Center

Breast Cancer Risk

Based on your responses to the questions about breast cancer risks, you have been identified as a patient with an increased risk for developing breast cancer. You may benefit from a visit to our breast cancer prevention clinic.

The Center for Breast Cancer Prevention further evaluates your risk of breast cancer based on certain factors. Our experts help you understand your risk of developing breast cancer and how to prevent it.

To schedule an appointment at one of the following locations, call **216-844-BRST** (216-844-2778):

**UH Seidman Cancer Center
at UH Case Medical Center**
11100 Euclid Avenue
Cleveland, Ohio 44106

St. John Medical Center
29000 Center Ridge Road
Westlake, Ohio 44145

UH Chagrin Highlands Health Center
3909 Orange Place
Orange Village, Ohio 44122

For more information on breast health,
visit us at **UHSeidman.org**

Among the nation's leading academic medical centers, University Hospitals Case Medical Center is the primary affiliate of Case Western Reserve University School of Medicine, a nationally recognized leader in medical research and education.



Take Home Points



- Follow ACS guidelines for screening recommendations
- Know your breast density and what it means
- Be aware of additional screening options for patients with dense breasts
- Ask high risk questions during evaluation and refer accordingly



Thank you

Mary Freyvogel, DO

Breast Surgeon

Clinical Assistant Professor of Surgery

University Hospitals Case Medical Center

St. John Medical Center / Elyria Medical Center