Are You Dense? Why Breast Density Matters

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I. Background
II. Definition of breast density
III. Review of dense breast inform legislation
IV. Diagnostic tools
V. Cases
Background and Overview of Breast Cancer

- In 2015, **290,000** new breast cancer diagnoses
  40,000 deaths

- Excluding skin cancer, breast cancer **most common** cancer among US women

- **75%** women diagnosed with breast cancer are not considered high risk and have no family history

“I no longer get mammograms. Mammograms increase your risk of getting breast cancer.”

“There’s no need for women readers to wait: Demand an MBI scan if you have dense breast tissue.”

Everyone feels entitled to have an...

- "I no longer get mammograms. Mammograms increase your risk of getting breast cancer."
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USPSTF 2009:

- Biennial (NOT ANNUAL) screening mammography recommended ages 50-74

- Recommended against teaching self breast examination
American Cancer Society 2015

- Annual screening 45-54
- >55: Annual or biennial
- 40-44: women given choice of annual
- Does not recommend clinical breast examination

Are you confused about guidelines for screening mammography?

Start @ 40 ANNUAL
- 40% of all of life years saved by mammography are for women in their 40s

- 1 of 6 breast cancers occur in women aged 40 to 49

- Biannual screening in women >50 reportedly may miss up to 30% of cancers
Breast Density: Definitions

How dense are you?

**LEVEL 1**
<25% Density
Fatty Breast Tissue

**LEVEL 2**
<50% Density
Scattered Density

**LEVEL 3**
>50% Density
Heterogeneously Dense

**LEVEL 4**
>75% Density
Extremely Dense
Breast Density: Why does it matter?

Level 1: “Fatty replaced”

Level 2: “Scattered Fibroglandular Density”

Level 3: “Heterogeneously dense”

Level 4: “Extremely Dense”

1.6x

2.3x

50%
Dr. Nancy Cappello: Founder of “Are you Dense”

November 2004: Negative mammogram

6 weeks later: Diagnosed with mammographically occult Stage 3c breast cancer

Started nonprofit for patient advocacy and to spread awareness of breast density
Summary of breast density notification states

- Pink: Enacted Law
- White: No Action
- Blue: In process
- ***: Insurance Coverage Laws

D.E.N.S.E.®
State Efforts
As of January 1, 2014, the state of Illinois will require health facilities that provide mammograms to notify women if they have dense breasts (Senate Bill SB2314).

Illinois is one of the only three states that currently mandate insurance reimbursement for supplemental screening exams for women with dense breasts.
Rauner signs 3D mammography bill at Advocate Lutheran in Park Ridge
July 20, 2016

SB466:
Requires 3D mammography to be included in a patient's insurance coverage
Diagnostic Tools to Assist with Dense Breasts

- Whole Breast Ultrasound
- 3D Mammography ("Digital Breast Tomosynthesis")
- MBI (Molecular Breast Imaging)
Diagnostic Tools: Whole Breast Ultrasound

Hand Held US versus Automated Whole Breast Ultrasound

IL Senate Bill 2314: Insurance coverage of whole breast US for dense breasts
Pitfalls of hand held US: Time intensive and operator dependent but NO radiation

3.5/1000 cancer detection rate

ASTOUND:
First published prospective trial comparing US and 3D in women with dense breasts.

US: 7.1/1000 added cancer detection rate vs 4/1000 3D

Whole Breast US: ACRIN 6666

- 2809 patients: 2004-2006
- Supplemental yield of whole breast ultrasound: 4.2/1000
- Substantial increase in risk of false positives
- Most cancers detected on US are invasive and node negative
- The positive predictive value of biopsy recommendation:
  - 22.6% for mammography
  - 8.9% for ultrasound (more false positives)
  - 11.2% mammogram + ultrasound

Diagnostic Tools: 3D Mammography

- X-ray tube rotates through a small arc acquiring a series of low-dose projection images of the breast from multiple angles.

- Projection images are reconstructed into a series of 1 mm slice thickness.

- 2D images acquired at same time.
Friedewald, SM et al:

- >450,000 patients
- **Increase** 41% invasive cancer detection rate
- **Increase** 21% PPV for biopsy (higher yield for malignancies in females undergoing 3D + 2D)
- **Decrease** recall rate 16/1000 patients

Friedewald, SM. et al. Breast Cancer Screening Using Tomosynthesis in Combination with Digital Mammography. JAMA 2014; 311(24); 2499-2507.
**Oslo Screening Trial (Skaane, P et al.):**

- Prospective study 12,631 patients, FFDM alone and combined with 3D
- Increase 40% invasive cancer detection rate
- Decrease 15% recall rate

Diagnostic Tools: Molecular Breast Imaging

Dedicated gamma camera imaging

functional breast image

preferential uptake of a radiopharmaceutical (such as $^{99m}$Tc-sestamibi) in tumors relative to normal tissue, independent of breast density
1651 asymptomatic women
Supplemental overall cancer detection of 8.8/1000
DCIS detection rate not significantly altered
Recall rate increased from 11.0% to 17.6% ($p < 0.001$) for the combination
Biopsy rate increased from 1.3% for mammography alone to 4.2% with MBI

Diagnostic Tools: Molecular Breast Imaging

What are we looking for in a mammogram? **Symmetry, stability, shape**

“One of these things is not like the other”

Stability  
Shape
Case 1: Screening Mammogram
Screening ultrasound: ? Mass at 7:00
Diagnostic Ultrasound: 0.78 cm mass at 7:00
(IDC 1/DCIS2)
MRI: 6.5 cm Lesion
Case 1: Negative mammogram
Case 2: Screening Mammogram
ULTRASOUND: 2.31 cm mass (DCIS 2)

3D: 4.4 cm mass
Case 3: Annual screening mammogram
Left CC 2D  
Left CC 3D  
Magnified 3D image
1.77 cm
IDC1
Malignant Invasive Lobular Carcinoma 1.97 cm
Contrast enhanced MRI: MIP Images

MRI: Axial T1 Postcontrast subtracted sequence
Case #5: Screening mammogram
Screening US: Malignant Invasive Lobular Carcinoma, Grade 1, 1.03 cm
Case 6: Screening Mammogram
Invasive Ductal Carcinoma
Grade 1 of 3
Case 7: Screening Mammogram
Invasive Ductal Carcinoma
Conclusions

No magic bullet: overlapping breast tissue obscures detection of cancers in dense breasts

Screening mammography is the only detection method shown to reduce mortality from breast cancer in randomized controlled trials

ANNUAL SCREENING MAMMOGRAM AGE 40

3D Mammography Supplemental Screening US as needed