MANAGEMENT OF DENSE BREASTS

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Number of New Cases and Deaths per 100,000: The number of new cases of breast cancer was 124.8 per 100,000 women per year. The number of deaths was 21.9 per 100,000 women per year. These rates are age-adjusted and based on 2008–2012 cases and deaths.

Lifetime Risk of Developing Cancer: Approximately 12.3 percent of women will be diagnosed with breast cancer at some point during their lifetime, based on 2010–2012 data.

Prevalence of This Cancer: In 2012, there were an estimated 2,975,314 women living with breast cancer in the United States.
Breast cancer is most frequently diagnosed among women aged 55-64.

Median Age At Diagnosis

61
Increased Cancer Risk ...  
DENSITY OF BREAST TISSUE
BREAST PATTERNS AS AN INDEX OF RISK FOR DEVELOPING BREAST CANCER

John N. Wolfe

ABSTRACT:

The radiographic appearance of the breast parenchyma provides a method of predicting who will develop a breast cancer. This paper describes a retrospective study of 7,214 patients. On the basis of the radiographic appearance of the breast parenchyma, patients were placed into one of four groups of risk for developing carcinoma of the breast. Follow-up studies revealed a stepwise progression in the incidence of developing carcinoma of the breast at least 6 months after the radiographic examination. In one of the two substudies, there was a 37 times greater incidence for those at highest risk compared to the low risk group. The classifications presented are thought to be of value in the everyday practice of mammography as well as in planning screening programs.
Dense = increased risk of cancer


What’s the truth?

• Risk highest in prominent nodular densities
  • Peyester 1977
• No increased risk with dense breast tissue
  • Egan 1979
  • Mendell 1977
• Other studies showing those reading the mammograms cannot agree on the density pattern
If increased, how much?

• Boyd 1984
  • DY (dense) pattern = 3 x risk of N1 (all fat) pattern in women < 50 years
  • Similar to the risk of a woman whose mother had postmenopausal cancer

• Boyd 1992
  • National Breast Screening Study of Canada
  • Densities of > 75% of breast volume = 9.7 x fatty pattern women for
    • DCIS
    • Atypical ductal hyperplasia
Relationship of Age to Density

- 80% women at age 30 have dense patterns
- Decreases by 0.1-0.2% each year until age of 45
- Decreases by 1-2% each year until age 65
- Approximately 40% remain dense throughout lifetime
Breast Cancer Risk Models

**BRCPRO**
BRCPRO is a statistical model, with associated software, for assessing the probability that an individual carries a germline deleterious mutation of the BRCA1 and BRCA2 genes, based on family history of breast and ovarian cancer, based on his or her family's history of breast and ovarian cancer, including male breast cancer and bilateral synchronous and asynchronous diagnoses.

**CancerMath.net Breast Cancer Outcome Calculator**
CancerMath.net web calculators provide medical professionals with tools for more accurately estimating the chance of survival for individual patients with breast cancer, melanoma, and renal cells carcinoma, and the impact that various treatment choices will have on that chance of survival.

**Memorial Sloan-Kettering Cancer Center**
Researchers at Memorial Sloan-Kettering Cancer Center have pioneered the use of computerized devices to help patients and their physicians decide among the major treatment choices for several cancers. Rather than relying on general risk groups of patient populations who share similar characteristics, our Breast Cancer Prediction Tools provide specific information.

**National Cancer Institute Risk Prediction Resources**
This site aims to provide resources to clinicians and researchers who are developing new and improving existing models for cancer risk, validating these models and evaluating their utility in research and clinic settings.

**Breast Cancer Risk Assessment Tool**
Based on a statistical model known as the 'Gail model', which is named after Dr. Mitchell Gail, Senior Investigator in the Biostatistics Branch of NCI's Division of Cancer Epidemiology and Genetics.

Sofia D. Merajver, MD, PhD, and Kara Milliron, MS, CGC, Ann Arbor, Michigan. © Journal of the National Comprehensive Cancer Network | Volume 1 Number 2 | April 2003
What’s my risk?
Density as predictor of cancer risk

• Yaghjyan Br J Cancer Sept 2015
  • 1010 postmenopausal breast cancer with 2077 matched controls
  • Women with ER- tumors had stronger association of percent density
  • No association with ER+, PR, or HER2
• 2003 study showed higher BMI = more fatty breast tissue
• Other 2015 studies showing childhood obesity and metabolic syndrome associated with dense breasts
Density conclusion ...

**Increase risk?**

By how much?

**Just a surrogate for other factors?**

Is it measurable enough to be used in risk assessments?
Best Imaging for

DENSE BREAST TISSUE
Mammography

- Only screening method shown to decrease mortality
- Annual screening
  - Age 40 for general population
  - 25-30 for BRCA carriers and first degree relatives
  - 25-30 or 10 years before relative’s diagnosis if
    - Relative had premenopausal cancer
    - Individual’s lifetime risk is >20%
  - 8 years after mantle radiation between ages 10-30
  - Lobular neoplasia, atypical ductal hyperplasia, DCIS, or invasive cancer
- Should be complimented with another modality in women with predisposition to disease and those with dense breasts
Wolfe Classification

• **N1**
  • Lowest risk
  • Parenchyma primarily fat

• **P1**
  • Low risk
  • Parenchyma mostly fat with ducts seen < 25% volume

• **P2**
  • High risk
  • Prominent duct pattern seen in > 25% volume of breast

• **DY**
  • Highest risk
  • Significant involvement with “dysplasia” often obscuring prominent duct pattern
American College of Radiology Classification

A. Fatty
B. Scattered Fibroglandular Densities
C. Heterogeneously Dense
D. Extremely Dense
Breast MRI

- Recommended as a supplemental screening test for high-risk women
- Gadolinium contrast can cause nephrogenic systemic fibrosis
  - Causes scleroderma-like symptoms
  - Increased risk if dialysis dependent and at times if GFR < 30
DENSE Trial

- Dense Tissue and Early Breast Neoplasm Screening (DENSE)
- Multicenter Randomized Control Trial
- Dutch, biennial population screening
- Aged 50-75 years
- Extremely dense breasts (ACR category D) and negative mammogram
  - Mammogram alone
  - Mammogram plus MRI
- Primary outcome variable is difference in the proportions of interval cancers between study arms
- Secondary outcomes
  - Number of MR detected cancers
  - Proportion of false-positive results
  - Diagnostic yield of MRI
  - Quality of life
  - Cost effectiveness
Breast Ultrasound - Screening

- Indicated in high-risk women who cannot receive an MRI
- What method?
- What operator?
American College of Radiology Screening

- **Average-risk women**
  - <15% lifetime risk of breast cancer
  - Breasts not dense
  - Mammography recommended

- **Intermediate-risk women**
  - Personal history of breast cancer
  - Lobular neoplasia
  - Atypical ductal hyperplasia
  - 15-20% lifetime risk of breast cancer
  - Mammography +/- breast MRI

- **High-risk women**
  - BRCA gene mutation or first degree relative
  - Chest irradiation between age 10-30
  - >20% lifetime risk
  - Mammography + breast MRI
As of March 2015, 58% of states have passed breast density legislation or other provision regarding breast density notification.

PINK: Enacted Law
RED: Introduced Bill
BLUE: Bill Under Development
WHITE: No action
BLACK: Insurance Coverage Mandate
Example of local algorithm

- **Low Risk 10-15%**
  - No first degree relatives and/or no significant personal breast pathology
  - ACR A-B: Yearly clinical exam and digital mammogram
  - ACR C-D: Above plus whole breast US every 2 years

- **Intermediate Risk 15-20%**
  - First degree post-menopause CA and/or hx biopsy with LCIS or atypical
  - ACR A-B: Yearly clinical exam & mammogram, and US every 2 years
  - ACR C-D: Above plus alternate MRI and US

- **High Risk > 20%**
  - First degree pre-menopause CA and/or mediastinal XRT or prior CA
  - ACR A-B: Yearly clinical exam, mammogram, alternate MRI and US
  - ACR C-D: Yearly clinical exam, mammogram, and MRI
How does newer mammogram technology assist us in managing dense breasts?

- **Digital mammography**
  - Multiple studies showed digital was as good as conventional
  - 2005 DMIST trial suggested digital better for dense breasts, women < 50, and pre/peri-menopausal
  - Digital did not decrease call back rate
  - Benefits of computer adjustable, electronically stored
  - Computer aided detection systems

- **Digital Breast Tomosynthesis**
  - TOMMY trial – in dense breasts adding DBT improved sensitivity from 86% to 93% and improved specificity
  - Ray 2015 – in cancers found on DBT that were occult on 2D, 63% were in dense breasts
Summary

- Dense breast tissue is associated with some increase in cancer risk
- National guidelines dictate additional screening and diagnostic modalities add benefit
- It is unclear how much benefit Ultrasound and MRI will bring to dense breast imaging
- Your patients will ask you about “dense breasts” on their mammogram report
- Digital mammography and DBT add benefit but do not supplant addition of Ultrasound and MRI at this time