


Importance of Breast Density in Breast Cancer Risk Assessment

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Risk assessment models are used to calculate a patient's risk of developing breast cancer and to determine if they require supplemental screening or preventative interventions.¹ Risk assessment models factor in typical breast cancer risks. However, not all models use the same set of risk factors. Having dense breasts is a risk factor for developing breast cancer, but it is not included in all assessment models. Two risk assessment models that include breast density in their risk calculations are the Tyrer-Cuzick model (IBIS tool) and the Breast Cancer Surveillance Consortium model.^{2,3} The Tyrer-Cuzick risk assessment model is the most used risk assessment model.³ The Tyrer-Cuzick model provides a score that is based on a patient's history and calculates their 10-year and lifetime risks of developing breast cancer.³ In contrast, the commonly used Breast Cancer Risk Assessment Tool (Gail model) does not include breast density. As mammography evolves, mammographic features, such as breast tissue density, should be considered when evaluating a patient's risk of breast cancer because it would provide a more accurate prediction of a patient's risk of developing breast cancer and allow more high-risk patients to receive supplemental screening.

Breast Cancer Risk Factors

A clear set of standards to determine whether a patient is at increased risk of breast cancer is important. The main risk factor for breast cancer is being a woman.⁴ Other risk factors to consider include⁴:

- age
- breast density
- breastfeeding history
- ethnicity
- family history
- hormonal birth control usage
- menstrual history
- number of births
- obesity
- race
- smoking

In addition, the rise in breast cancer diagnosis is related to an increase in risk factors such as⁵:

- early menarche (< 12 years)
- fewer pregnancies
- advanced age at first pregnancy (> 30 years)
- late menopause (> 55 years)
- shorter or no periods of breast feeding

The **Table** illustrates which factors increase and which decrease the likelihood of having breast cancer.^{5,6} As the incidence of breast cancer continues to rise, updates to risk assessment models must be considered.

Breast Density

Breast density is not a risk factor that is discussed often; usually, there is more concern with family history when discussing risk of developing breast cancer. Breast density describes the amount of fibroglandular tissue in the breast compared with fatty tissue.⁶ On a mammogram, fibroglandular tissue appears white and

Table

Factors that Increase or Decrease Risk of Breast Cancer^{5,6}

Increase	Decrease
Hormone replacement therapy	Increasing age
Live birth after age 30	Decreasing body mass index
Smoking	Long periods of breastfeeding
Dense breast tissue	Healthy lifestyle

fatty tissue black. Breast cancer also appears white on a mammogram, which makes it challenging to diagnose breast cancer in dense breast tissue.⁷

Dense breast tissue is the most common risk factor for breast cancer among women. Increased breast density accounts for 16% of all breast cancers diagnosed, 40% of interval cancers diagnosed, and 12% of screen-detected cancers.⁷ Mammograms are less accurate because breast cancers tend to hide in areas of increased breast density.⁷ A study performed between 1966 and 1998 assessed 329 495 women who had a screening mammogram.⁴ The study found that mammography had a sensitivity of 87% and a specificity of 97% for the women that had fatty breasts.⁷ For the women that had extremely dense breast tissue, mammography had a sensitivity of 63% and a specificity of 89%.⁷ However, this study was conducted more than 20 years ago, and currently, digital breast imaging is used, which is more accurate in the prevention and diagnosis of breast cancer. A similar study that included more than 300 000 women in the United States found that digital mammography has a higher sensitivity for women with dense breast tissue compared with screen-film mammography (83.6% vs 68.1%).⁷

During mammography, breast density often is determined using the Breast Imaging Reporting and Data System (BI-RADS), which assesses the overall density of tissue based on a visual calculation.⁶ Radiologists use this information in addition to their subjective opinion to give patients their descriptive results.⁶ The 4 BI-RADS categories of breast density are⁶:

- A – almost entirely fatty
- B – scattered areas of fibroglandular density
- C – heterogeneously dense
- D – extremely dense

Supplemental Screening

Breast density should be considered when determining a patient’s screening schedule.⁶ Clinicians and providers should understand the breast density categories (BI-RADS) and how breast density affects breast health. For patients with dense breast tissue, supplemental screening modalities, including magnetic resonance (MR) imaging and whole-breast sonography should be considered.⁶ MR imaging might be recommended along with mammography for women with dense breast tissue; women with family history of breast cancer might be on a rotating schedule of MR imaging 6 months after their annual mammogram. Sonography might show if an abnormality is fluid filled or solid and might show abnormalities in dense tissue that were missed on a mammogram. Sonography and MR imaging might be used in a challenging case. MR imaging might be necessary for a biopsy when sonography or stereotactic biopsies cannot be performed. The American College of Radiology Imaging Network 6666 trial evaluated the use of MR imaging and sonography in the detection of cancer in patients with dense breast tissue who are at a higher risk of breast cancer.^{6,8} The research found that the use of MR imaging increased the detection rate of cancers to 14.7 per 1000 women compared with mammography.^{6,8}

Conclusion

Currently, 2 risk assessment models include breast density in their risk calculations, the Tyrer-Cuzick model and the Breast Cancer Surveillance Consortium model. More studies on breast tissue density and how the inclusion of density categories in risk assessment models affects their accuracy are needed. A universal risk assessment model that includes breast density could improve the accuracy of risk assessment for breast cancer. In addition, patients who have dense breast tissue are at a higher risk of developing breast cancer, and the dense tissue can obscure cancerous tissue on mammograms. Therefore, patients with dense breasts might require supplemental screening, such as sonography and MR imaging.

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