

Reporting on Breast Density

- Breast density depends on the amounts of fatty and fibroglandular tissue within the breast parenchyma. It is categorized into four categories: A–D with D being the most dense
- Dense breast tissue is associated with decreased sensitivity for detecting breast cancer on mammography or breast tomosynthesis
- Massachusetts State law requires that patients must be notified if they have dense breasts. This information is included in the results letter sent to all patients undergoing screening mammography at Mass General
- There is no evidence that cancers diagnosed in dense breasts are associated with a higher death rate than those in less dense breasts
- Additional screening (MRI) may be recommended when individual risk factors suggest a lifetime risk of breast cancer >20%

Breast tissue is a combination of fat, fibrous, and glandular tissue. Fatty tissue appears uniform and dark on mammography, whereas the network of fibrous and glandular tissues is more radiopaque. Dense breast tissue is a common finding, occurring in approximately 50% of women. It is more commonly seen in younger women as breast density can decrease with age. The network of fibroglandular tissue can obscure underlying breast abnormalities, resulting in decreased sensitivity of mammography in dense breasts. However, the sensitivity is somewhat better on digital breast tomosynthesis (DBT), a protocol used routinely for mammographic screening at Mass General, than on digital mammography.

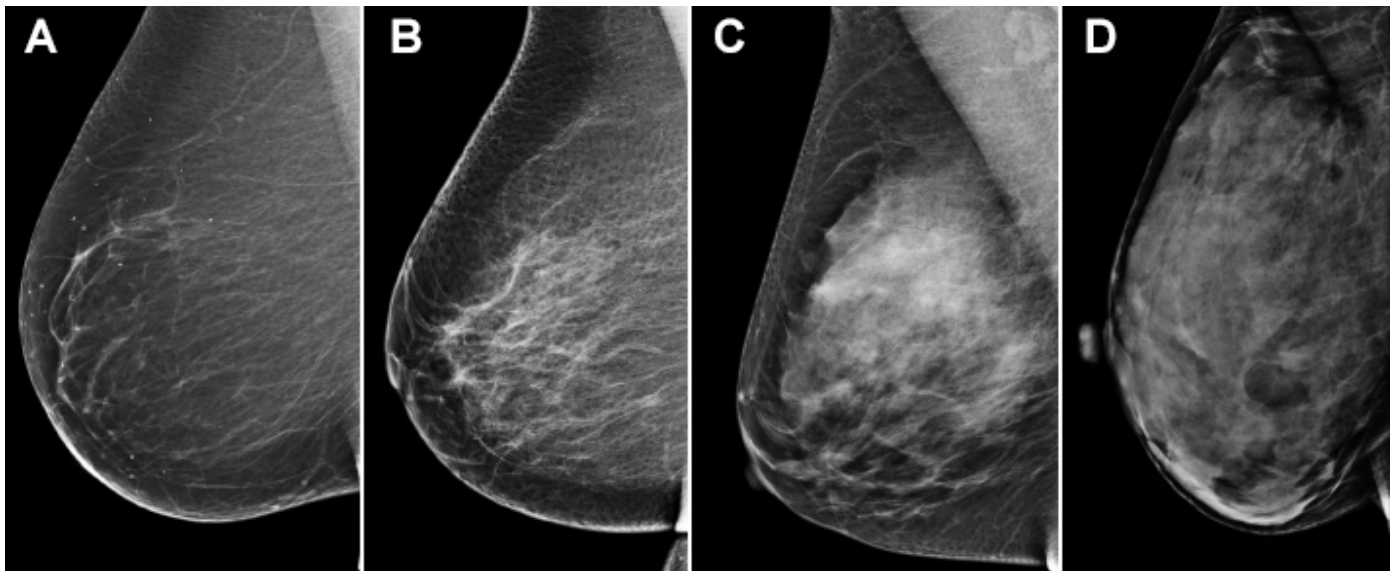


Figure 1. BI-RADS categories of breast density. (A) almost entirely fatty; **(B)** scattered areas of fibroglandular density, **(C)** heterogeneously dense; and **(D)** extremely dense.

The standard breast reporting system, BI-RADS, includes four categories for reporting breast density. In category A, the breast tissue is almost entirely fat; in category B, it has scattered areas of fibroglandular tissue; in category C, it is heterogeneously dense, which may obscure small masses; and in category D, it is extremely dense, which lowers the sensitivity of mammography (Figure 1). In cases in which breast density is asymmetrical, density is classified by the denser breast. In the US, about equal numbers are classified as categories B and C; women in these groups account for about 80% of the population. The remaining 20% are divided equally between categories A and D. Breast density cannot be assessed by palpation.

Breast density is an independent risk factor for the development of breast cancer. Overall, the risk for developing breast cancer is 1 in 8 women. Women with category D density have a 4-5 fold greater risk of developing breast cancer compared to women with category A density. However, there are many other risk factors for breast cancer, most notably the presence of *BRCA1* and *BRCA2* mutations, other genetic syndromes such as Li-Fraumeni disease, or a family history of breast cancer. Other predisposing factors include early menarche, late menopause, nulliparity, hormone replacement therapy, race/ethnicity, and prior radiation therapy to the chest.

Several states, including Massachusetts, have passed legislation that requires that patients be notified if mammography shows that their breasts are dense, defined as categories C or D. Fifty percent of all women fall in this group. Information on US states that have enacted laws on reporting breast density can be found [online](#).

Table 1. Recommendation Criteria for Breast MRI Screening as an Adjunct to Mammography

Documented BRCA mutation

Untested women with first degree relative with BRCA mutation

Life-time risk of developing cancer >20-25% calculated from family and personal history

Radiation to chest between ages 10 and 30 years

First-degree relative with pre-menopausal breast cancer

Massachusetts Breast Density Notification Law

Massachusetts law requires that all mammography providers notify a patient in writing if an interpreting physician determines that the patient has dense breast tissue based on the BI-RADS reporting system promulgated by the American College of Radiology. The notification must include, at a minimum:

1. That the patient's mammogram shows dense breast tissue;
2. The degree of density and an explanation of that degree of density;
3. That dense breast tissue is common and not abnormal but that breast density may increase the risk of breast cancer;
4. That dense breast tissue can obscure cancer on mammograms and that additional testing may be advisable for reliable breast cancer screening;
5. That the patient should discuss the results of the mammogram with her referring physician or primary care physician;
6. That the patient has the right to discuss the results of her mammogram with the interpreting radiologist or the referring physician;
7. That a report of the patient's mammogram has been sent to the referring physician and will become part of the patient's permanent record; and
8. Where the patient can find additional information about breast density.

At Mass General, a results letter is sent to all patients undergoing screening mammography, informing them of the result of the screening mammogram as well as their breast density. Information required by the law, including what dense breasts mean and where to find additional information on supplemental screening, is also provided ([see Appendix](#)). A similar results letter and information about breast density is also given to all patients undergoing diagnostic mammography on the day of their appointment.

Assessing Cancer Risk

If a woman has dense breasts, it is recommended that she discuss her breast cancer risk factors and the possibility of further screening tests with her doctor. Not all women with dense breasts require further screening. In a recent comprehensive study on determining whether women with dense breasts were at high risk of developing interval cancer (cancers that develop between mammographic screenings), calculated that if all women with dense breasts were provided with supplemental screening, 1124 supplemental tests would reveal one additional cancer. Therefore, the cost of potential false positive findings may outweigh the benefit.

Another large comprehensive study of over 9,000 women diagnosed with primary invasive breast carcinoma showed that women with dense breasts (category D) did not have a higher death rate from breast cancer, even when stratified for stage at diagnosis and other prognostic factors. The hazard ratio for breast cancer death in women

with extremely dense breasts was 0.92 (CI: 0.71–1.09) when compared to those with category B breasts. The only factor that correlated with breast density was an increased death rate due to breast cancer in women with fatty breasts who were obese and had tumors >2 cm at diagnosis.)

All studies to date that have shown the benefits and cost-effectiveness of supplemental screening with MRI have been performed in patients who were already deemed at high risk of breast cancer, regardless of breast density. Table 1 shows the clinical criteria for high risk that warrant annual MRI screening for breast cancer. Ultrasound is not sufficiently specific to be beneficial as a supplemental screening tool.

Several models have been developed to assess the risk of a woman developing breast cancer in her lifetime, based on family history of breast and/or ovarian cancer, the presence of certain gene mutations, and personal history. For example, BRCAPRO, statistical software that calculates the probability of breast cancer risk, incorporates detailed family history to assess risk, although all estimates of risk are somewhat imprecise. If statistical modeling indicates that a woman has a lifetime risk of >20% for developing breast cancer, then further screening studies (mainly screening breast MRI) are warranted.

Screening Breast MRI for High-Risk Patients

Breast MRI is currently the most sensitive detection technique for diagnosing breast cancer. It has a comparable specificity to mammography and a significantly higher specificity than ultrasound. In a high-risk population, MRI combined with mammography has a sensitivity of 92.7%. The American Cancer Society recommends screening MRI in certain high-risk women as a cost-effective procedure. However, MRI is not recommended for patients with severe renal dysfunction because of the risk of developing nephrogenic systemic fibrosis associated with the administration of gadolinium contrast agents. Supplemental screening with ultrasound is only recommended for patients who cannot undergo an MRI.

Scheduling

Screening mammography with digital breast tomosynthesis is performed at the Mass General main campus in Boston, Mass General West Imaging – Waltham, MGH Revere HealthCare Center, and Mass General/North Shore Center for Outpatient Care in Danvers. Breast MRI is performed at the Mass General main campus in Boston, Mass General Imaging – Chelsea, Mass General West Imaging – Waltham, and Mass General/North Shore Center for Outpatient Care in Danvers. Appointments can be made through [ROE](#) (inside Partners network) or [ROE Portal](#) (outside Partners network) or by calling 617-724-XRAY (9729).

Further Information

For further information on imaging guidelines for dense breasts, please contact [Mansi Saksena, MD](#), Breast Imaging Division, Department of Radiology, Massachusetts General Hospital, at 617-726-3093.

High risk assessment consultations are provided at the Avon Breast Center at the Mass General main campus. Please call 617-724-4800 for more information.

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