Nearly half a century since its introduction into clinical practice, mammography remains the criterion standard for breast cancer detection. Women who participate in a modern breast cancer screening program have 60% lower risk of dying from breast cancer within 10 years of diagnosis and 47% lower risk within 20 years compared with women who do not. Still, the mammogram is an imperfect screening tool, and the sensitivity for cancer detection is inversely proportional to breast density. False-positive rates in breast cancer screening are also a considerable limitation of mammography, and high callback rates may lead to unnecessary biopsies, increasing costs, and patient anxiety. Although cancer detection is most important, recall reduction is also a valuable metric for women undergoing screening mammography.

Lowry et al evaluated 1,584,079 screening mammograms at 46 Breast Cancer Surveillance Consortium facilities. The authors analyzed the performance of digital breast tomosynthesis (DBT) and full-field digital mammography (FFDM) at baseline as well as on subsequent screens. They stratified performance according to specific breast density categories. The authors report that DBT improved recall and cancer detection rates for all women at baseline screening. On subsequent screens, women in both nondense (scattered fibroglandular densities) and dense (heterogeneously dense) categories benefited from improved recall and cancer detection rates with DBT; however, for women with extremely dense breast tissue, there was no such benefit.

Numerous observational studies have shown improved screening outcomes with DBT compared with FFDM, including lower recall and higher cancer detection rates. Most DBT studies have focused on prevalent round data and grouped mammographic density into 2 main categories (fatty or dense). More studies assessing DBT performance on incident screening rounds and stratifying breast density by Breast Imaging Reporting and Data System density category are needed. In the study by Lowry et al, the largest improvement in recall reduction and cancer detection rates occurred at first screening (no prior images) for all ages and density categories, supporting the findings of prior series. In subsequent rounds of DBT, performance varied based on age and density. For example, both recall rates and cancer detection rates improved with DBT for women 40 to 79 years of age with heterogeneously dense breasts and for women 50 to 79 years of age with scattered fibroglandular density. Women aged 50 to 79 years with almost entirely fatty breasts benefited from decreased recall rates during subsequent rounds, but there was no change in cancer detection rates. The authors did not include data about the specific sequences of examinations (ie, DM after DM, DBT after DM, DM after DBT, and DBT after DBT). Therefore, the association of a particular imaging sequence with performance in subsequent rounds remains an unknown but important factor to consider, especially in practices in which DBT is not uniformly available at all sites or in which FFDM and DBT prescribing habits may be mixed from year to year.

One prior publication examined the performance of subsequent rounds of DBT screening, evaluating 44,468 DBT examinations during 4 consecutive years. The authors compared recall, cancer detection, and false-negative rates to previous FFDM-only screening. During 3 years of DBT, compared with FFDM alone, recall rates remained lower and the trend toward increased cancer detection rates continued. Women who underwent only 1 DBT after previous FFDM screening were compared with those who underwent 2 and 3 rounds of DBT screenings. Recall rates were noted to drop with each round of DBT screening. Cancer detection rates fluctuated, decreasing at the second round of DBT compared with the first, but subsequently increasing at the third round. The authors suggest a prevalence round screening effect on cancer detection rates with tomosynthesis, but also...
note that the lower cancer detection rate for women after 2 DBT screenings (6.2 per 1000 women) was still higher than published data for incidence screening round with FFDM.

For women with extremely dense breasts, Lowery et al⁴ found that DBT did not perform better than FFDM on subsequent screening rounds for recall or cancer detection. This may seem counterintuitive; however, extremely dense breasts may contain so little fat that the fat-lesion interface needed for lesion conspicuity is absent, and lesions without architectural distortion may still escape detection. Women with extremely dense breast tissue should be cautioned not to view this result as “permission” to forgo mammographic screening entirely. Calcifications without associated mass are typically visible by both FFDM and DBT and may be the only presenting sign of an invasive malignant neoplasm. In addition, malignant calcifications are often occult on other supplemental screening modalities, such as whole-breast screening ultrasonography.

Approximately 75% of the additional cancers detected with DBT in the Lowery et al study⁴ were invasive cancers. The authors did not provide the specific tumor histology, grade, or stage of the malignant neoplasms; however, prior reports of invasive cancers detected with DBT indicate that these cancers tend to be smaller, more often node negative, and ERBB2 (formerly HER2) negative compared with FFDM-detected cancers.⁷ Given this, there is hope that with DBT, screening breast cancer mortality and morbidity rates will improve. The currently enrolling randomized clinical trial TMIST (Tomosynthesis Mammographic Imaging Screening Trial) will compare screening outcomes of approximately 165 000 women aged 45 to 75 years who are randomized to either FFDM or DBT screening for 5 years. The primary aim of the trial is to compare the number of advanced cancers in each arm, with the hypothesis that DBT screening will eventually decrease the number of advanced cancers compared with FFDM screening.

Although breast density notification laws have been implemented in 38 US states, there is no consensus regarding the use of supplemental imaging in women with dense breasts. The results of the present study⁴ suggest that women with extremely dense breast tissue may benefit more from additional screening than women with heterogeneously dense breasts who undergo tomosynthesis mammography. Research to determine density and risk-specific outcomes for supplemental screening methods, such as magnetic resonance imaging (including abbreviated protocols), molecular breast imaging, or ultrasonography is necessary to understand which screening method beyond DBT is best for average-risk women with heterogeneous or extremely dense breasts.

Digital breast tomosynthesis is more expensive than FFDM owing to the increased cost of equipment, image storage, and examination and reading times. Because third-party payer coverage for screening DBT is variable, these additional costs may be incurred by patients. As a result, some women may feel the need to choose between DBT and FFDM. Although there is still much work to be done to achieve truly personalized breast cancer screening, these new results may help inform discussions between women and their physicians about how best to use limited health care resources.

ARTICLE INFORMATION
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