

## 3D mammography technique benefits some women, not all

June 14 2022

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For many women, breast cancer screening with a three-dimensional imaging technique called digital breast tomosynthesis (DBT) may not offer advantages over digital mammography, but for some it may reduce

the chance of an advanced cancer diagnosis, according to a new study published June 14 in *Journal of the American Medical Association (JAMA)*.

The Food and Drug Administration first approved marketing of DBT equipment in 2011 and now tomosynthesis is available at most [breast screening](#) centers. In comparison to a standard digital mammogram, in which low-dose X-rays are used to obtain images of the breast from the front and side, tomosynthesis is used to obtain X-rays of the breast from many angles to assemble 3D images.

Researchers who conducted the new study of 504,427 [women](#), ages 40 to 79, found that those with the densest breasts and higher-than-average [breast cancer](#) risk benefited most from DBT.

"A small percentage of women—3.6 percent in our study—clearly benefit from DBT with respect to reducing the rate of advanced breast cancer diagnosis," said Karla Kerlikowske, MD, a professor of medicine and epidemiology and biostatistics at UC San Francisco and the first author of the *JAMA* study.

Advanced breast cancers are tumors that are large and/or have spread to lymph nodes. They require surgery and systemic treatment and detecting breast cancers through screening before they become advanced may avert deaths from breast cancer.

The study authors found that DBT had additional advantages for women with other specific risk profiles. The researchers used data from the Breast Cancer Surveillance Consortium (BCSC) to compare screening outcomes for the women, who for analysis were grouped into cancer risk categories using the BCSC [risk-assessment tool](#) and breast density measurements made during screening.

In the nearly 44 percent of women in the study with non-dense breasts and low-to-average risk for breast cancer, screening by DBT resulted in fewer false-positive results and in turn fewer breast biopsies in which no cancer was detected. Among the 29 percent of women in the study with scattered fibroglandular densities or heterogeneously dense breasts and also a higher-than-average breast cancer risk, DBT screening had a higher rate of detection of small invasive breast cancers that were contained within the breast, suggesting that DBT was identifying more breast cancers earlier than [digital mammography](#).

However, for most of the study population the researchers did not find a statistically significant difference in the rates of diagnosis of advanced cancer or for the entire population, rates of cancers diagnosed between screening intervals or missed on mammography.

The study is the largest to date to compare rates of early-stage invasive cancer detection and of advanced-stage breast cancer diagnosis (either detected on the screen or within one year of a normal screen) with the two screening technologies, Kerlikowske noted. The diagnosis of a tumor that has grown to a more advanced stage is sometimes due to the previous screening failing to reveal a tumor that was already present. However, aggressive tumors also may arise between recommended screening intervals and be diagnosed due to symptoms.

Breast cancer screening has harms as well as benefits. It may lead to anxiety-inducing false-positive results (an abnormal finding on a screening mammograms that is determined to be non-cancerous on diagnostic work-up), and to medically invasive procedures and treatment to eliminate small tumors confined to milk ducts that might not ever grow to become invasive breast cancer or lead to a subsequent invasive cancer diagnosis.

Standard screening recommendations regarding the ages and intervals at

which women are advised to be screened through mammography are geared toward the majority of women who are regarded to be at average risk for breast cancer—those without an inherited breast cancer gene or an early-life history of radiation treatment, for example. But as researchers and clinicians develop new risk models to individualize screening recommendations, they also are mindful of other factors that may increase cancer risk, including dense breasts.

Women with dense breasts, heterogeneously or extremely dense, or opaque on mammography images, have a higher proportion of connective and milk duct tissue. Tumors similarly appear opaque and may be more likely to go undetected with imaging in denser breasts. Because DBT is three-dimensional, it has been envisioned as a means of detecting more tumors earlier in women with dense breasts.

Kerlikowske and colleagues in their previous research found a three- to four-fold increased risk for a breast cancer diagnosis within five years for post-menopausal women whose breast density is 75 percent or more compared to women whose breast density is 25 percent or less."DBT was developed with the expectation it would improve detection of breast cancer in women with dense breasts and decrease false-positive results," Kerlikowske said. "Our study shows that overall, DBT does not reduce the risk of tumors becoming symptomatic between screening intervals or being missed by screening. But the fact that our study shows a decrease in advanced cancer diagnosis among women with the highest density and higher-than-average risk of breast cancer and an increase in early-stage cancer detection for women with higher-than-average risk of breast [cancer](#) suggests that DBT may allow detection of aggressive cancers earlier, before they become advanced in specific groups of women."

**More information:** *Journal of the American Medical Association* (2022). [jamanetwork.com/journals/jama/.../1001/jama.2022.7672](https://jamanetwork.com/journals/jama/.../1001/jama.2022.7672)

Provided by University of California, San Francisco

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<https://medicalxpress.com/news/2022-06-3d-mammography-technique-benefits-women.html>

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