

# Tomosynthesis is revolutionizing the way we screen for breast cancer

By Stephen L. Rose, MD

## Background

Breast tomosynthesis is a new method for breast cancer screening and diagnosis. Unlike prior-generation mammography systems, which generate 2-dimensional images, breast tomosynthesis produces 3-dimensional images, which are intended to reveal the inner architecture of the breast free from the superimposition of overlying structures. While tomosynthesis can be acquired independently, a screening examination, as required by the U.S. Food and Drug Administration (FDA), includes a tomosynthesis data set in combination with a 2-dimensional image. The perfectly registered images take only seconds longer to acquire than a conventional 2-dimensional digital mammogram at a total exam dose within current FDA guidelines for screening mammography.

A tomosynthesis scan virtually eliminates detection challenges associated with overlapping structures in the breast, which is the primary drawback of conventional 2-dimensional analog and digital mammography. In addition, breast tomosynthesis offers other potential benefits, including increased lesion and margin visibility, help in localizing structures in the breast, a reduction in recall rates, and increased cancer detection.

## Patient Information

A 42-year-old female presents for a routine screening mammogram.

## Imaging Findings

A 2-dimensional mammogram shows no suspicious findings. Upon review of the tomosynthesis dataset, a 7-mm spiculated mass was detected in the upper outer quadrant of the left breast at 2 o'clock. Ultrasound confirmed the presence of a suspicious mass at 2 o'clock measuring 7 mm.

## Diagnosis

T1b, N0, M0 stage 1A invasive ductal carcinoma

## Treatment

Lumpectomy with radiation. No chemotherapy.

## Discussion

The use of tomosynthesis in the screening setting was essential for the early diagnosis in this patient. The tumor is imperceptible on standard 2-dimensional imaging, however, the tomosynthesis slices demonstrate a spiculated mass because of the ability to peel away the superimposing tissue that obscures the distortion on the 2-dimensional images. This can be seen clearly on both MLO and CC projections.

We have seen a reduction in call back rates for additional testing by approximately 50%, while increasing our detection of very early cancers.

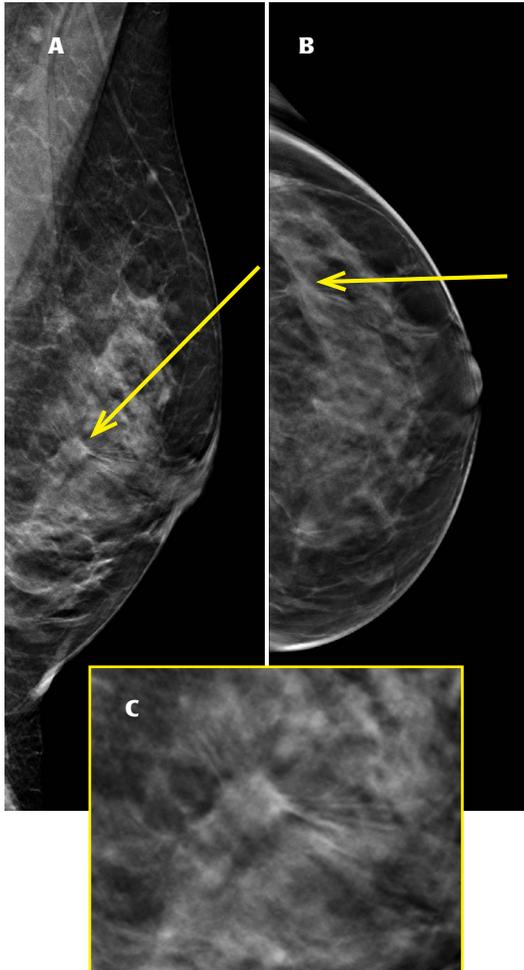
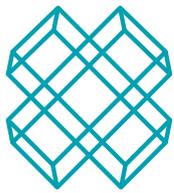
The ultrasound exam confirms the presence of a small lesion at 2 o'clock in the left breast. An ultrasound-guided biopsy was performed documenting a 7-mm infiltrating ductal carcinoma.

Early detection of breast cancer is associated with decreased mortality and reduced morbidity.<sup>1</sup> It is unclear when or if this cancer would be revealed on future 2-dimensional mammography in this heterogeneously dense breast or if it would have only been discovered as a palpable finding at a much later stage in the disease process. In addition to the drawbacks of 2-dimensional imaging, many women, especially in their 40's, do not get yearly mammograms, therefore, we would miss any opportunity to detect this cancer before it.

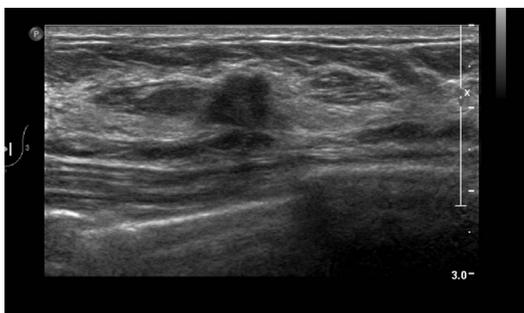
## Conclusion

Tomosynthesis is a revolutionary new approach to screening for breast cancer. In our practice, we have seen a reduction in call back rates for additional testing by approximately 50%, while increasing our detection of very early cancers. Our practice has performed over 10,000 screening tomosynthesis exams

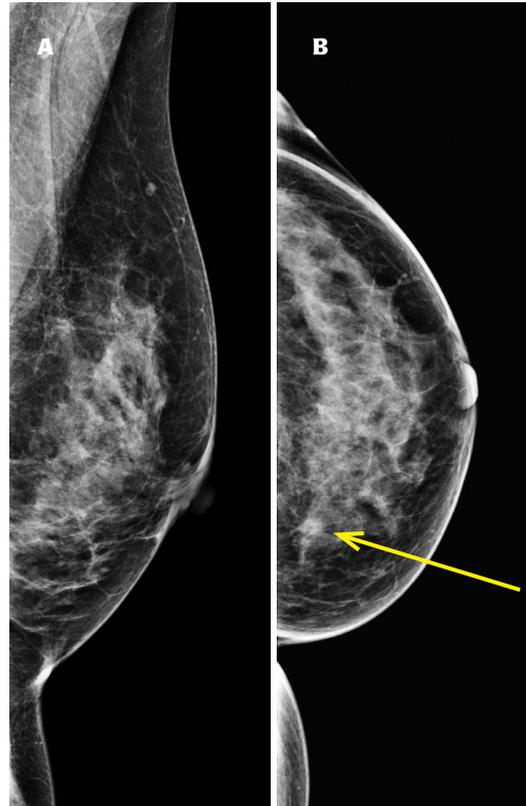
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**Tomosynthesis Exam.** The (A) LMLO and (B) LCC slices of the tomosynthesis dataset demonstrate a spiculated mass in the upper outer quadrant (arrows). The region of interest is shown enlarged in (C). The mass is not visible in the corresponding 2-dimensional images because of superimposed structures.



**Ultrasound Exam.** An ultrasound exam confirmed the presence of a small lesion at 2 o'clock in the left breast. An ultrasound-guided biopsy was performed documenting a 7-mm infiltrating ductal carcinoma.



**Conventional 2-dimensional Exam.** The upper outer quadrant lesion is not visible in the standard (A) LMLO and (B) LCC views. (Note: the medial mass in the 2-dimensional CC view (arrow) was shown to be superimposed structures using tomosynthesis.)

and is currently doing an evaluation of 2-dimensional exams read alone versus the combination of 2-dimensional/tomosynthesis exams. Initial results are extremely encouraging. Our data on call back rates match those reported by others using tomosynthesis in the screening environment.<sup>2</sup>

"I think tomosynthesis is a practical solution because unlike some modalities," said Dr. Rose, "tomosynthesis is easy to use and efficient, enabling us to screen almost everyone."

## References

1. Gullien R, Eben E, Ekseth U, et al. Reading time of FFDM and tomosynthesis in a population-based screening program. RSNA 2011. Breast series: Emerging technologies in breast imaging. MSVB31-07. [http://rsna2011.rsna.org/search/event\\_display.cfm?printmode=n&em\\_id=11011027](http://rsna2011.rsna.org/search/event_display.cfm?printmode=n&em_id=11011027). Updated November 29, 2011. Accessed March 13, 2012.
2. Tabár L, Vitak B, Chen TH, et al. Swedish two-county trial: Impact of mammographic screening on breast cancer mortality during 3 decades. *Radiology*. 2011;260:658-663. Epub 2011 Jun 28.

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