Selected Scientific Publications on Breast Tomosynthesis

2013


* Key Point: The study results demonstrated that obtaining both views is necessary to ensure that a cancer will be optimally visualized and derive the greatest potential benefit from tomosynthesis.


* Key Point: The authors conclude that DBT offers similar sensitivity and specificity compared to conventional digital mammography for the evaluation of noncalcified findings recalled from screening mammography. The authors also concluded that for more than 90% of the findings, two-view DBT was sufficient for further mammographic evaluation, and can replace conventional diagnostic mammography.


* Key Point: Tomosynthesis finds lesions occult on 2D mammography from screening, in diagnostic workup, or evaluation of palpable masses. Tomosynthesis can also be used for preoperative localization for obtaining a histologic diagnosis.


* Key Point: >70% non-calcified breast cancers are visualized only or better on tomosynthesis imaging in women with scattered and heterogeneously dense breasts. Cancers are visualized equally well on tomosynthesis and 2D mammography in women with fatty and extremely dense breasts.


* Key Point: Although DBT is equivalent to SFM for breast screening among women aged 50-74 years, the cancer detection rate was significantly lower for CR making CR 21% less effective among all screening examinations. Screening programs should monitor the performance of CR separately and may consider informing women of the potentially lower cancer detection rates.


* Key Point: This large screening study results demonstrated that the addition of tomosynthesis resulted in reduction in recall rate with an increase in cancer detection rates. The authors further conclude that in this large prospective population, the screening outcomes significantly improved for 5 of 6 readers as measured by PPV1 and remained stable for 1 reader.


* Key Point: The study results demonstrated that combined 2D/3D mammography improves the cancer detection by 51% and also reduces the false-positive recall rates by 17%.


* Key Point: The authors conclude that cancers presenting with architectural distortion were detected significantly better with tomosynthesis as compared to digital mammography. Similar effect was observed in characterizing cancer morphology.


* Key Point: The authors conclude that 30% more cancers are detected by the addition of tomosynthesis to FFDM in their screening program. They also conclude that biopsy PPV3 improved with the addition of tomosynthesis to their practice.


* Key Point: The study concludes that the cancer detection rate increased by 12% after the addition of breast tomosynthesis to digital mammography.


* Key Point: The study results demonstrated a significant reduction in recall rates (~30%, the greatest reductions seen for women younger than 50 years old and in women with dense breasts) along with an increase in the cancer detection rate (9.5% overall) after the introduction of tomosynthesis in the clinical practice.

* Key Point: The results show that digital breast tomosynthesis has a higher diagnostic accuracy of breast cancers compared to FFDM and Ultrasound, especially for parenchymal distortion and asymmetric density.


* Key Point: The authors conclude that screening with tomosynthesis demonstrates greater cost-effectiveness especially in younger women and women with dense breasts. The overall cost reduction of unnecessary diagnostic workups was ~17%.


* Key Point: The study results demonstrated an increase in the sensitivity and diagnostic accuracy in the detection of ILC using digital breast tomosynthesis. The effect was more pronounced in women with dense breasts.


* Key Point: The additional breast cancers detected by DBT show different radiological presentation and histology than breast cancers detected with DM, most commonly architectural distortions and tubular breast cancers.


* Key Point: The study concludes that the addition of DBT to conventional 2D screening mammography increases the cancer detection rate by 61%.


* Key Point: The authors conclude that the addition of tomosynthesis resulted in fewer number of images per diagnostic case that resulted in the faster patient diagnostic workup and in better patient throughput and resource utilization.


* Key Point: Radiologist performance for diagnostic accuracy and recall rate significantly improved for with the addition of tomosynthesis to digital mammography.


* Key Point: The authors conclude that the number of patients categorized as BI-RAD3 needing follow-up will be reduced with the use of tomosynthesis in diagnostic mammography.


* Key Point: The study results demonstrated a significant reduction in recall rates (~37%) along with an increase in the cancer detection rate (35% overall, 54% for invasive cancers) after the introduction of tomosynthesis in the clinical practice.


* Key Point: The study results demonstrated that double reading improved cancer detection rate by 30% and decreased the false-positive rate by 18% during mammographic screening.


* Key Point: In a screening study involving over 12,000 women, the addition of tomosynthesis to digital mammography resulted in a 40% increase in the cancer detection rate for invasive cancers, and a simultaneous significant decrease in false-positive rate. The increase was observed across all breast densities.


* Key Point: There was no significant difference in the positive predictive values and cancer detection rates between synthetically reconstructed 2D images with DBT and FFDM plus DBT.


* Key Point: The authors conclude that addition of tomosynthesis increases the interpretation time, but that the time is acceptable for high-volume screening. This time decreases with increasing experience, increasing the interpretation time by approximately 40% compared to FFDM.


* Key Point: Tomosynthesis significantly improved diagnostic accuracy for non-calcified lesions compared to supplemental mammographic views.
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* Disclaimer: This is for informational purposes only and may or may not contain all the findings of the study.
(AB) Kalra V, Haas B, Forman H, Philpotts L. Cost-Effectiveness of Digital Breast Tomosynthesis. Presented at RSNA 2012, LL-BRS-WE5C Breast Imaging Afternoon CME Posters. * Key Point: Combined DBT lead a direct cost savings of $10,185 per 1,000 women screened resulting from decreased callback rates. Given that there also appears to be a trend for improved cancer detection rate, combined DBT appears to be preferable to FFDM alone for screening mammography.

(AB) Martinez P, Sainz M, Garcia-Lallana A, Minguillon C, Simon I, Viteri G, Pina L. The Role of Additional Digital Tomosynthesis Combined with Digital Mammography. Presented at RSNA 2012, SSE02-02 Breast Imaging (Digital Breast Tomosynthesis). * Key Point: Results show that additional Tomosynthesis increases the detection rate per 1000 from 1.5% to 2.33% - an increase of 55% and there are no significant differences among the three ACR density patterns 2, 3 and 4.


* Key Point: Tomosynthesis reduces the recall rate by more than 40% when combined with 2D mammography than 2D mammography alone.

(AB) Poplack S, Frazee T, Zhongze L, Elizabeth D, Tosteson T. A Comparison of Digital Breast Tomosynthesis versus Contrast Enhanced Magnetic Resonance Imaging in the Preoperative Assessment of Breast Cancer. Presented at RSNA 2012, SSM02-01 Breast Imaging (MRI and Digital Mammography Topics). * Key Point: CEMRI is more accurate in determining local disease extent than DBT. On average CEMRI detects 3x as many additional lesions as DBT. A similar proportion of the additional lesions detected by each modality reflects atypical or malignant histology and results in a similar proportional change in management. DBT is more acceptable to patients than CEMRI.

(AB) Raghavan B, Rajmohan M, Sivaramalingam G. Role of breast tomosynthesis in the morphological analysis of breast lesions. Presented at ECR 2012, SS 602 Tomosynthesis and FFDM. * Key Point: Tomosynthesis correlated more accurately than 2D digital mammograms with BI-RADS categorization from histopathological examinations; tomosynthesis also useful for morphological analysis of breast lesions.

(AB) Raghavan B, Selvakumar D. Role of Tomosynthesis in assessing the size of the breast lesion. Presented at ECR 2012, C-1045 Scientific exhibit. * Key Point: This is a preliminary study that shows 3D mammography to be as reliable as 2D in predicting tumor size especially in stellate lesions and dense breast parenchyma, if it is measurable.

(AB) Rose S, Ice M, Nordmann A, Sexton R, Song R. A Comparison of Recall Rates between Full Field Digital Mammography (FFDM) and Full Field Digital Mammography Plus Tomosynthesis in a Community Setting. Presented at RSNA 2012, SSE02-01 Breast Imaging (Digital Breast Tomosynthesis). * Key Point: Adding tomosynthesis to FFDM reduced recall rates in a routine screening population by approximately 35%.

(AB) Rose S, Buinoch L, O’Toole M, Nordmann A, Sexton R, Willson K, Tidwell A. Breast Tomosynthesis and Digital Mammography for Breast Cancer Screening: Medical Outcomes Audit. Presented at RSNA 2012, VSBR41-06 Breast Series: Emerging Technologies in Breast Imaging. * Key Point: These preliminary results demonstrate that cancer detection increased while recall rates decreased after the introduction of breast tomosynthesis combined with full field digital mammography. In addition the positive predictive values for both recalls and biopsies increased.

(AB) Roubidoux M, Lee W, Zebb L, Nees A, Hadijski L, Jeffries D, Chan H, Neal Colleen, Carson P, Melville D. Role of Ultrasound to Evaluate and Characterize Masses Evident by DBT. Presented at RSNA 2012, LL-BRS-WE2C Breast Imaging Afternoon CME Posters. * Key Point: Sensitivity was high for DBT alone. DBT + US mode decreased false positive biopsy recommendations; DBT + US mode improved accuracy over DBT alone for the less experienced reader, but was not statistically significant. Mean time for characterization of a mass with DBT and US for an experienced reader was about 2 minutes.

(AB) Simon-Yarza I, Viteri G, Garcia-Lallana A, Ibanez I, Elizalde A, Pina L. The Role of Tomosynthesis after Normal Mammography According to ACR Density Patterns. Presented at RSNA 2012, LL-BRS-WE1D Breast Imaging Afternoon CME Posters. * Key Point: Additional TS in oblique mediolateral view after normal mammograms increases the detection rate from 1.96% to 2.42%. It can be useful not only in dense patterns (3&4), but also in scattered fibroglandular densities (pattern 2).


(AB) Wu Y, Munoz Del Rio A, Burnside E. Quantifying the Performance of Tomosynthesis in the Diagnosis of Breast Cancer. Presented at RSNA 2012, VSB41-10 Breast Series: Emerging Technologies in Breast Imaging. * Key Point: We find that 2D + 3D provides higher diagnostic value compared with 2D alone. Mutual information analysis can specify the relative value of diagnostic information and is complementary to AUC analysis.

(AB) Zuley M. Diagnostic Accuracy of Tomosynthesis vs Mammographic Supplemental Views: Impact of Lesion Shape Perception. Presented at RSNA 2012, SSE02-08 Breast Imaging (Digital Breast Tomosynthesis). * Key Point: Tomosynthesis enables improved diagnostic performance for non-calcified lesions in part but not entirely due to improved perception of lesion shape.

2011


* Key Point: Tomosynthesis plus FFDM could result in better performance.


* Key Point: Tomosynthesis is comparable or slightly superior to supplementary views when using in patients requiring further diagnostic work-up.


(AB) Ngaen E, Campbell B, Low G. The Utilization of Spot Compression Views and Average Glandular Dose in a Combined Digital Breast Tomosynthesis and Digital Mammography Clinical Practice. Presented at RSNA 2011, MSVB31-11 Breast Series: Emerging Technologies in Breast Imaging. * Key Point: The combination of tomosynthesis and conventional mammography did not reduce the utilization of spot compression views by a statistically significant amount.


(P) Spangler ML, Zuley ML, Sumkin JH, Abrams G, Ganott MA, Hakins C, Perrin R, Chough DM, Shah R, Gur D. Detection and classification of calcifications on digital breast tomosynthesis and 2D digital mammography: a comparison. AJR Am J Roentgenol. 2011;196(2):320-324.* Key Point: FFDM slightly more sensitive for the detection of calcification than tomosynthesis. However, no significant difference was found in diagnostic performance between the two as measured by area under the curve using BI-RADS.

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* Key Point: Tomosynthesis offers an alternative to digital spot compression views (DSCVs) and offers lower mean glandular dose than DSCVs.


* Key Point: Tomosynthesis has comparable sensitivity and specificity to standard diagnostic mammographic views in the classification of non-calcified breast lesions

2010


2009


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2008


2007


2006

Mainprize JG, Bloomquist AK, Kempston MP, Yaffe MJ. Resolution at oblique incidence angles of a flat panel imager for breast tomosynthesis. Med Phys. 2006 Sep;33(9):3159-64.


2005


2004


2000

1998

1997