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Demonstrating the benefits of True 3D Breast Tomosynthesis

Recent clinical studies

Answers for life.

Summary

Following its introduction in 2009, a host of clinical studies on Digital Breast Tomosynthesis* have proceeded to demonstrate the value of this technique for breast imaging. The following is a summary of key findings from the latest studies conducted with Mammomat Inspiration and True 3D Breast Tomosynthesis.

Author and study title	Year	Key findings
Galati et al., "Added value of one-view DBT combined with DM according to readers' concordance - changing in BIRADS rate and follow-up management: A preliminary study"[1]	2014	The combination of two-view DM and one-view DBT increased concordance between readers for the BIRADS classification and reduced recalls.
Mercier et al., "The role of tomosynthesis in breast cancer staging in 75 patients"[2]	2014	Tomosynthesis found more lesions than mammography in 10% of patients, resulting in changes to surgical planning.
Uchiyama et al., "Clinical Efficacy of Novel Image Processing Techniques in the Framework of Filtered Back Projection (FBP) with Digital Breast Tomosynthesis (DBT)"[3]	2014	The novel FBP reconstruction method was significantly superior to standard FBP. In particular, diagnostic certainty regarding the assessment of microcalcifications was improved with the novel FBP.
Tani et al., "Assessing Radiologist Performance and Microcalcifications Visualization Using Combined 3D Rotating Mammogram (RM) and Digital Breast Tomosynthesis"[4]	2014	The visualization of microcalcifications was significantly improved for all microcalcification-dominant cancer lesions with the adjunction of RM to DBT.
Dustler et al., "Image Quality of Thick Average Intensity Pixel Slabs Using Statistical Artifact Reduction in Breast Tomosynthesis"[5]	2014	It is possible to review DBT volumes with 2 mm slabs without compromising image quality and the visibility of microcalcifications is improved.
Lang et al., "Breast cancer detection in digital breast tomosynthesis and digital mammography: a side-by-side review of discrepant cases"[6]	2014	Lesion visualization with DBT is superior to FFDM, particularly for spiculated tumors, suggesting that DBT is better than DM for visualizing breast cancer.
Abdurahman et al., "Optimizing High Resolution Reconstruction in Digital Breast Tomosynthesis Using Filtered Back Projection"[7]	2014	Optimized Filtered Back Projection (FBP) showed significant improvements in the contrast and sharpness of microcalcifications and reduced noise compared to a baseline FBP method with standard filter settings.
Bernathova, "Digital breast tomosynthesis - another milestone in breast imaging"[8]	2014	DBT has comparable or superior image quality and a higher conspicuity of lesions. It improved specificity and accuracy, increased the detection rate and has the potential to decrease recall rates.
Zackrisson et al., "Performance of one-view breast tomosynthesis versus two-view mammography in breast cancer screening - First results from the MALMÖ BTST"[9]	2014	One-view DBT alone increased breast cancer detection rate by 43 % compared to 2-view FFDM. The results suggest that 1-view DBT may be feasible as a single screening modality.
Pina et al., "Digital mammography vs digital breast tomosynthesis in an enriched sample"[10]	2014	DBT significantly increases the sensitivity of lesion detection.
Van Ongeval et al., "Is DBT the new standard in diagnostic imaging? How to implement in specialist training?"[11]	2014	DBT has the best diagnostic accuracy and the best early detection rate for breast lesions and is more accurate in determining lesion size compared to DM and US.
Nagl et al., "Interpretation of calcifications in comparison to mammography"[12]	2014	Detection and characterization of calcifications in DBT is at least equal to FFDM.
Bick et al., "Tomosynthesis and the impact on patient management"[13]	2014	In screening DBT improved cancer detection rates while at the same time reducing recalls for false-positives.

*True 3D Breast Tomosynthesis is not yet commercially available in all countries. Due to regulatory reasons its future availability cannot be guaranteed. Please contact your local Siemens organization for further details.

Author and study title	Year	Key findings
Lang et al., "Breast Tomosynthesis in Screening"[14]	2014	DBT significantly increases breast cancer detection, reduces recall rates and allows a reduction in compression force. Screening therefore becomes more comfortable for women.
Pina et al., "Interpretation of masses, distortions and densities with Tomosynthesis"[15]	2014	DBT increases the detection rate of breast cancers by up to 27% and is very sensitive to spiculation and architectural distortions, which resulted in a high PPV.
Schwab et al., "X-ray induced formation of γ-H2AX foci after full-field digital mammography and digital breast-tomosynthesis"[16]	2013	Mammography induces a small but significant increase of γ-H2AX foci in patients' systemic blood lymphocytes. This indicator of DNA damage was less prominent after DBT than FFDM.
Schulz-Wendtland et al., "Full Field Digital Mammography (FFDM) versus CMOS Technology, Specimen Radiography System (SRS) and Tomosynthesis (DBT) - Which System Can Optimise Surgical Therapy?"[17]	2013	Mammomat Inspiration tomosynthesis system had the highest sensitivity of the three systems tested. The rate of re-excisions was reduced compared to results from FFDM systems.
Dustler et al., "A Study of the Feasibility of using slabbing to reduce Tomosynthesis Review Time"[18]	2013	Slabbing in screening significantly reduces reading time.
Slon et al., "The Role of Additional Ultrasound and Tomosynthesis After Normal Digital Mammography: Comparison Between Both Techniques"[19]	2013	The study results show that DBT detected additional cancers not visible with DM and increased the detection rate.
Extano et al., "The additional role of tomosynthesis after normal mammography according to ACR density patterns"[20]	2013	DBT is useful in ACR III-IV dense breasts as well as for scattered fibroglandular breasts (ACR II), increases sensitivity compared to FFDM and detects more invasive cancers, in particular tubular cancers.
Heywang-Köbrunner et al., "Use of Tomosynthesis for the assessment of screen-detected lesions"[21]	2013	Due to higher specificity, diagnostic performance is improved if DBT replaces additional 2D FFDM Views.
Uchiyama et al., "Diagnostic Impact of Adjunction of Digital Breast Tomosynthesis (DBT) to Full Field Digital Mammography (FFDM) and in Comparison with Full Field Digital Mammography (FFDM)"[22]	2012	DBT+FFDM detect more cancers than FFDM alone. DBT as an adjunct to FFDM was able to detect early-stage breast cancer and is not affected by breast density.
Dance et al., "Comparison of breast doses for digital tomosynthesis estimated from patient exposures and using PMMA breast phantoms"[23]	2012	The results conclude that the dose for tomosynthesis with the Siemens Mammomat Inspiration system is lower than other vendors.
Uchiyama et al., "Usefulness of Adjunction of Digital Breast Tomosynthesis (DBT) to Full-Field Digital Mammography (FFDM) in Evaluation of Pathological Response after Neoadjuvant Chemotherapy (NAC) for Breast Cancer" [24]	2012	The adjunction of DBT to FFDM combined with other diagnostic modalities contributes to more accurate assessment of response to NAC. The adjunction of DBT to FFDM improves the assessment of lesions and their margins without utilizing a contrast medium.
Svahn et al., "Breast tomosynthesis and digital mammography: a comparison of diagnostic accuracy"[25]	2012	The diagnostic accuracy of BT was significantly higher than that of DM.
Uchiyama et al., "Evaluation of correlation between pathological size and diagnostic size"[26]	2012	The diagnostic performance of DBT+FFDM was comparable to MRI and DBT+FFDM also had a higher correlation between diagnostic and pathological size.
Förnvik et al., "Breast tomosynthesis: Accuracy of tumor measurement compared with digital mammography and ultrasonography"[27]	2010	The study indicates that BT is superior to DM in the assessment of breast tumor size and stage.

Author and study title	Year	Key findings
Förnvik et al., "The effect of reduced breast compression in breast tomosynthesis: human observer study using clinical cases"[28]	2010	No difference in image quality was evident with reduced compression, indicating that DBT can be performed with substantially less compression force compared with 2D mammography. The majority of women examined felt that half compression was more comfortable than full compression.
Saunders et al., "Can compression be reduced for breast tomosynthesis? Monte Carlo study on mass and microcalcification conspicuity in tomosynthesis."[29]	2009	For constant glandular dose, mass and microcalcification conspicuity remained constant at decreased compression levels.

Summary

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Summary

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