HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™
Clinical Papers

HOLOGIC®
The Science of Sure

3D MAMMOGRAPHY™ Studies

Updated: April 2018

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Breast Cancer Characteristics Associated with 2D Digital Mammography versus Digital Breast Tomosynthesis for Screening-detected and Interval Cancers Bahl M, Gaffney S, McCarthy AM, Lowry KP, Dang PA, Lehman CD Radiology. 2018 Apr;287(1):49-57. doi: 10.1148/radiol.2017171148. Epub 2017 Dec 22 ***Key Point:** The authors reviewed screening mammograms (2D) from January 2009 to February 2011 and then the DBT group of mammograms, January 2013 to February 2015 and found that the overall rates of screening detected and interval cancers were similar between DM & DBT groups. They found a higher proportion of invasive cancers rather than in situ with DBT	Apr-18	X				X		X	X	
Digital Breast Tomosynthesis and Synthetic 2D Mammography versus Digital Mammography: Evaluation in a Population-based Screening Program Hofvind S, Hovda T, Holen ÅS, Lee CI, Albertsen J, Bjørndal H, Brandal SHB, Gullien R, Lømo J, Park D, Romundstad L, Suhrke P, Vigeland E, Skaane P Radiology. 2018 Mar 1:171361. doi: 10.1148/radiol.2018171361 ***Key Point:** There was an increase detection rate of tumors with DBT and SM screening compared to digital mammography alone.	Mar-18	X				X		X		
Impact of Addition of Digital Breast Tomosynthesis to Digital Mammography in Lesion Characterization in Breast Cancer Patients Mohindra N, Neyaz Z, Agrawal V, Agarwal G, Mishra P. Int J Appl Basic Med Res. 2018 Jan-Mar;8(1):33-37. doi: 10.4103/ijabmr.IJABMR_372_16 ***Key Point:** The utilization of DBT improves morphological characterization of lesions in patients with breast cancer as well as highlighting more suspicious features of lesions that indicate the presence of cancer, particularly in dense breasts.	Mar-18	X						X		

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Initial Experience of Tomosynthesis-Guided Vacuum-Assisted Biopsies of Tomosynthesis-Detected (2D Mammography and Ultrasound Occult) Architectural Distortions Patel BK, Covington M, Pizzitola VJ, Lorans R, Giurescu M, Eversman W, Lewin J AJR Am J Roentgenol. 2018 Mar 23:1-6. doi: 10.2214/AJR.17.18802 ***Key Point:** A significant number of carcinomas, particularly grade 1 cancers, were easily detected by the use of the minimally invasive method of Tomosynthesis-guided VAB.	Mar-18									X
Outcome of Architectural Distortion Detected Only at Breast Tomosynthesis versus 2D Mammography Alshafeiy TI, Nguyen JV, Rochman CM, Nicholson BT, Patrie JT, Harvey JA. Radiology. 2018 Mar 27:171159. doi: 10.1148/radiol.2018171159 ***Key Point:** A restrospective study, 2009 to 2016, found digital breast tomosynthesis detected suspicious AD has a lower malignancy outcome compared with 2D mammography-detected suspicious AD, although still high enough to warrant biopsy.	Mar-18					X				
Pathologic Upgrade Rates of High-Risk Breast Lesions on Digital Two-Dimensional vs Tomosynthesis Mammography Lamb LR, Bahl M, Hughes KS, Lehman CD J Am Coll Surg. 2018 Feb 2. pii: S1072-7515(18)30032-2. doi: 10.1016/j.jamcollsurg.2017.12.049 ***Key Point:** There was no difference in the upgrade rates of high-risk breast lesions on DM vs DBT, but the proportion of high-risk lesion upgrades that are invasive rather than in situ carcinoma was higher with DBT.	Feb-18		X			X				
Can the synthetic C view images be used in isolation for diagnosing breast malignancy without reviewing the entire digital breast tomosynthesis data set? Murphy MC, Coffey L, O'Neill AC, Quinn C, Prichard R, McNally S. Ir J Med Sci. 2018 Feb 9. doi: 10.1007/s11845-018-1748-7 ***Key Point:** Although the C view image gives additional information when compared to a screening 2D mammogram, the full DBT tomosynthesis data set needs to be reviewed to diagnose a breast malignancy	Feb-18	X								
Performance of breast cancer screening using digital breast tomosynthesis: results from the prospective population-based Oslo Tomosynthesis Screening Trial Skaane P, Sebuødegård S, Bandos AI, Gur D, Østerås BH, Gullien R, Hofvind S Breast Cancer Res Treat. 2018 Feb 10. doi: 10.1007/s10549-018-4705-2 ***Key Point:** Significant increases in screen-detected cancers and specificity were the results when DBT was used for screening mammograms.	Feb-18	X						X		

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Breast cancer screening with digital breast tomosynthesis - 4 year experience and comparison with national data Huay-Ben Pan, Kam-Fai Wong, Anthony Yao, Giu-Cheng Hsu, Chen-Pin Chou, Huei-Lung Liang, Jer-Shyung Huang, Hung-Ju Li, Shu-Chin Wang, Tsung-Lung Yang Journal of the Chinese Medical Association, Volume 81, Issue 1, January 2018, Pages 70-80 ***Key Point:** Digital breast tomosynthesis, when compared to 2D alone, was more effective at detecting DCIS and stage 1 cancers.	Jan-18	X						X		
Tomosynthesis in Breast Cancer Imaging: How Does It Fit into Preoperative Evaluation and Surveillance? Eghtedari M, Tsai c, Robles J, Blair SL, Ojeda-Fournier H Surgical Oncology Clinics of North America - Volume 27, Issue 1, January 2018, Pages 33-49 ***Key Point:** Digital breast tomosynthesis, compared to FFDM, can be used for screening and diagnostic imaging as well core biopsies and wire localization procedures, performing more accurately in the dense breast.	Jan-18						X	X		
Breast tomosynthesis for the clarification of mammographic BI-RADS 3 lesions can decrease follow-up examinations and enables immediate cancer diagnosis Bahrs SD, Otto V, Hattermann V, Klumpp B, Hahn M, Nikolaou K, Siegmann-Luz K Acta Radiol. 2018 Jan 1:284185118756458. doi: 10.1177/0284185118756458 ***Key Point:** Compared to 2D mammography alone, DBT has the potential to reduce the recall-rate of BI-RADS 3 lesions and to find and diagnose malignant lesions earlier.	Jan-18						X			
Synthesized Mammography: The New Standard of Care When Screening for Breast Cancer with Digital Breast Tomosynthesis? Ambinder EB, Harvey SC, Panigrahi B, Li X, Woods RW Acad Radiol. 2018 Jan 25. pii: S1076-6332(17)30541-X. doi: 10.1016/j.acra.2017.12.015 ***Key Point:** This retrospective study, (2013 - 2016), found the use of synthesized mammogram + DBT to have no significant effect on biopsy rate, PPV1, PPV3, or CDR. Also a decrease in recall rate in the SM + DBT group, support the use of SM for patients undergoing screening with DBT.	Jan-18	X								
Digital Breast Tomosynthesis vacuum assisted biopsy for Tomosynthesis-detected Sonographically occult lesions Ariaratnam NS, Little ST, Whitley MA, Ferguson K - Clinical Imaging Volume 47, January–February 2018, Pages 4-8 ***Key Point:** DBT VAB is fast and accurate for lesions found through DBT and occult on FFDM and breast ultrasound.	Jan-18		X							X

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Chapter 4 – Implementation of Digital Breast Tomosynthesis Into Clinical Practice Destounis S, Arieno A, Morgan R, Philpotts LE - Breast Tomosynthesis 2018, Pages 18–25 ***Key Point:** Attributable to its diagnostic performance, DBT will, in due course, become the standard of care.	Jan-18						X			
Chapter 7 – Tomosynthesis Interpretation Tips and Pitfalls Philpotts LE, Hooley RJ - Breast Tomosynthesis 2018, Pages 56–73 ***Key Point:** There are reduced screening recalls and fewer diagnostic mammograms requiring short interval follow-ups (BI-RADS 3) with DBT	Jan-18	X								
Improving digital breast tomosynthesis reading time: A pilot multi-reader, multi-case study using concurrent Computer-Aided Detection (CAD) Balleyguier C, Arfi-Rouche J , Levy L, Toubiana PR, Cohen-Scali F, Toledano AY, Boyer B European Journal of Radiology - Volume 97, December 2017, Pages 83-89 ***Key Point:** With or without CAD, radiologist sensitivity, specificity and recall rate were similar and utilizing CAD resulted in a faster reading time with non-inferiority of interpretation performance.	Dec-17	X		X						
Implementation of Upright Digital Breast Tomosynthesis-guided Stereotactic Biopsy Omofoye S, Martaindale S, Teichgraeber DC, Parikh JR Academic Radiology - Volume 24, Issue 11, November 2017, Pages 1451-1455 ***Key Point:** Upright digital breast tomosynthesis-guided biopsy is a proven method for sampling abnormalities found only with tomosynthesis as well as 2D abnormalities.	Nov-17									X
Role of Digital Breast Tomosynthesis in Screening and Diagnostic Breast Imaging Destounis S - Seminars in Ultrasound, CT and MRI Available online 14 August 2017 ***Key Point:** This article describes the history of digital breast tomosynthesis through the review of peer-reviewed publications and scientific presentations.	Aug-17	X	X							
Primary breast osteosarcoma mimicking calcified fibroadenoma on screening digital breast tomosynthesis mammogram Bennett DL, Merenda G, Schnepp S, Lowdermilk MC - Radiology Case Reports Available online 29 July 2017 ***Key Point:** Primary breast osteosarcoma lesion presents as a "sunburst" on the DBT images and should be followed up because of similarities to a calcifiedfibroadenoma.	Jul-17		X					X		

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Characterization of Breast Masses in Digital Breast Tomosynthesis and Digital Mammograms: An Observer Performance Study Chan HP, Helvie MA, Hadjiiski L, Jeffries DO, Klein KA, Neal CH, Noroozian M, Paramagul C, Roubidoux MA - Academic Radiology Available online 21 June 2017 ***Key Point:** BI-RADS assessment of breast masses and inter-radiologist reliability was considerably improved in DBT alone over DM (digital mammography)	Jun-17	X								
Breast Tomosynthesis: Practical Considerations Friedewald S - Radiologic Clinics of North America Volume 55, Issue 3, May 2017, Pages 493-502 ***Key Point:** The decrease of false-positive examinations and the increase of cancer detection is achieved with the use of digital breast tomosynthesis.	May-17	X		X		X		X		
Synthesized Digital Mammography Imaging Freer PE, Winkler N - Radiologic Clinics of North America Volume 55, Issue 3, May 2017, Pages 503-512 ***Key Point:** Utilizing a synthesized 2D image with DBT in a screening exam instead of acquiring a FFDM image reduces the radiation dose by nearly one-half, making DBT more widely available clinically.	May-17				X					
Breast Tomosynthesis: Clinical Evidence Poplack S - Radiologic Clinics of North America Volume 55, Issue 3, May 2017, Pages 475-492 ***Key Point:** When compared to digital mammography, imaging the breast with DBT for non-calcified findings has equivalent or superior performance.	May-17							X		
Value Analysis of Digital Breast Tomosynthesis for Breast Cancer Screening in a US Medicaid Population Miller JD, Bonafede MM, Herschorn SD, Pohlman SK, Troeger KA, Fajardo LL - Journal of the American College of Radiology Volume 14, Issue 4, April 2017, Pages 467-474.e5 ***Key Point:** In order to deliver value-based care to Medicaid programs, a wider adoption of DBT is necessary and it reduces the need for follow-up diagnostic services while improving the detection of invasive cancers.	Apr-17						X			
Clinical Performance of Synthesized Two-dimensional Mammography Combined wth Tomosynthesis in a Large Screening Population Aujero M, Gavenonis S, Benjamin R, Zhang Z, Holt J - Radiology. 2017 Apr;283(1):70-76. doi: 10.1148/radiol.2017162674 ***Key Point:** Synthesised 2D + DBT performed better than DBT + FFDM or FFDM alone in a large coummunity based proctice in terms of recall rates, PPVs without any loss in cancer detection rate . **Summary Card**	Apr-17	X		X	X	X		X		

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Breast cancer detection using single-reading of breast tomosynthesis (3D-mammography) compared to double-reading of 2D-mammography: Evidence from a population-based trial Houssami N, Bernardi D, Pellegrini M, Valentini M, Fantò C, Ostillio L, Tuttobene P, Luparia A, Macaskill P - Cancer Epidemiology Volume 47, April 2017, Pages 94-99 ***Key Point**: The authors found an increase detection of breast cancer and lower false positive rates with the single-reading of DBT compared to a double-reading of FFDM.	Apr-17	X				X				
Imaging Surveillance After Primary Breast Cancer Treatment Lam DL, Houssami N, Lee JM AJR Am J Roentgenol. 2017 Mar; 208(3): 676–686. ***Key Point:** DBT is viewed to have the most promise as a potential modality to replace FFDM as the front-line surveliillance test because of the evidence of significant decrease in recall rates.	Mar-17									
Characterisation of noise and sharpness of images from four digital breast tomosynthesis systems for simulation of images for virtual clinical trials Mackenzie A, Marshall N, Hadjipanteli A, Dance D, Bosmanns H, Young K - Phys. Med. Biol. 62(2017)2376-2397. doi.org/10.1088/1361-6560/aa5dd9 ***Key Point:** Evaluation and comparrison of four differnet digital breast tomosynthesis manufacturers in terms of image sharpness and image noise.	Feb-17	X								
Value Analysis of Digital Breast Tomosynthesis for Breast Cancer Screening in a US Medicaid Population. Miller JD, Bonafede MM, Herschorn SD, Pohlman SK, Troeger KA, Fajardo LL - J Am Coll Radiol. 2017 Jan 26. pii: S1546-1440(16)31328-X. doi: 10.1016/j.jacr.2016.11.019. ***Key Points:** Wider adoption of DBT presents an opportunity to deliver value-based care to Medicaid programs and to help address disparities and barriers to accessing preventive care by some of the nation's most vulnerable citizens.	Jan-17	X					X			
Diagnostic performance of tomosynthesis and breast ultrasonography in women with dense breasts: a prospective comparison study Kim WH, Chang JM, Lee J, Chu AJ, Seo M, Gweon HM, Koo HR, Lee SH, Cho N, Bae MS, Shin SU, Song SE, Moon WK - Breast Cancer Res Treat. 2017 Jan 12. doi: 10.1007/s10549-017-4105-z. ***Key Point:** Tomosynthesis exhibits comparable performance to U/S as an adjunct to mammography for diagnosis of breast cancer, except among women with extremely dense breasts.	Jan-17		X			X		X		

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Digital breast tomosynthesis: Dose and image quality assessment A. Maldera, P. De Marco, P.E. Colombo, D. Origgi, A. Torresin - Physica Medica Volume 33, January 2017, Pages 56-67 ***Key Point:** The paper offers a comparison for dose and image quality among four DBT systems and finds the the reconstruction and post processing algorithms greatly affects the image quality.	Jan-17				X					
Breast cancers detected in only one of two arms of a tomosynthesis (3D-mammography) population screening trial (STORM-2). Bernardi D, Houssami N - Breast. 2017 Jan 17;32:98-101. doi: 10.1016/j.breast.2017.01.005. ***Key Point:** This short report describes 13 (from 90) cancers detected in only one of two parallel double-reading arms implemented in STORM-2. Most were detected at 3D-mammography only and predominantly by one reader from double-reading pairs, highlighting that 3D-mammography may enable detection of cancers that are challenging to perceive at routine screening.	Jan-17	X				X				
Breast Cancer Screening, Mammography, and Other Modalities Fiorica JV - Clin Obstet Gynecol. 2016 Dec;59(4):688-709. ***Key Point:** This article is an overview of the modalities available for breast cancer screening. The data is designed to help the clinician individualize breast cancer screening for each patient.	Dec-16	X				X				
Diagnostic performance of digital breast tomosynthesis with a wide scan angle compared to full-field digital mammography for the detection and characterization of microcalcifications. Clauser P, Nagl G, Helbich TH, Pinker-Domenig K, Weber M, Kapetas P, Bernathova M, Baltzer PA. - Eur J Radiol. 2016 Dec;85(12):2161-2168. doi: 10.1016/j.ejrad.2016.10.004. Epub 2016 Oct 7. ***Key Point:** Wide scan-angle DBT enabled the detection and characterization of micro-calcifications with no significant differences from FFDM. Inter-reader variability was seen.	Dec-16		X			X				
Replacing single-view mediolateral oblique (MLO) digital mammography (DM) with synthesized mammography (SM) with digital breast tomosynthesis (DBT) images: Comparison of the diagnostic performance and radiation dose with two-view DM with or without MLO-DBT. Kang HJ, Chang JM, Lee J, Song SE, Shin SU, Kim WH, Bae MS, Moon WK - Eur J Radiol. 2016 Nov;85(11):2042-2048. doi: 10.1016/j.ejrad.2016.09.007. Epub 2016 Sep 12. ***GE tomo*** ***Key Point:** The combined use of CC-DM plus MLO-DBT with SM showed higher sensitivity and specificity to two-view DM with a smaller AGD increment and comparable diagnostic performance to that of two-view DM with MLO-DBT with a significantly lower mean AGD.	Nov-16	X			X					

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Breast Cancers Found with Digital Breast Tomosynthesis: A Comparison of Pathology and Histologic Grade. Wang WS, Hardesty L, Borgstede J, Takahashi J, Sams S - Breast J. 2016 Nov;22(6):651-656. doi: 10.1111/tbj.12649. ***Key Point:** Breast cancers identified through the addition of tomosynthesis are associated with Nottingham grade 1 histologic pathology and prognostically more favorable than cancers identified with conventional digital mammography alone.	Nov-16					X		X		
A comparison between digital breast tomosynthesis and full-field digital mammography for the detection of breast cancers. Choi WJ, Kim HH, Lee SY, Chae EY, Shin HJ, Cha JH, Son BH, Ahn SH, Choi YW - Breast Cancer. 2016 Nov;23(6):886-892. Epub 2015 Nov 3. ***Key Point:** The findings also demonstrated that combining DBT and FFDM is superior in detecting cancer compared to standard FFDM.	Nov-16					X		X		
Non-calcified ductal carcinoma in situ of the breast: comparison of diagnostic accuracy of digital breast tomosynthesis, digital mammography, and ultrasonography. Su X, Lin Q, Cui C, Xu W, Wei Z, Fei J, Li L - Breast Cancer. 2016 Nov 11 ***Key Point:** DBT and US gave better detection rates and diagnostic accuracy for non-calcified DCIS compared with DM in all cases and in dense breasts. The detection rate of DBT was lower than that of US in all cases and in dense breasts. The diagnostic accuracy of DBT was slightly higher than that of US in all cases and in dense breasts, but the difference was not statistically significant.	Nov-16	X	X			X		X		
Digital Breast Tomosynthesis Utilization in the United States: A Survey of Physician Members of the Society of Breast Imaging. Hardesty LA, Kreidler SM, Glueck DH - Am Coll Radiol. 2016 Nov;13(11S):R67-R73. doi: 10.1016/j.j acr.2016.09.030. ***Key Point:** DBT is becoming more common but remains a limited resource. Clinical guidelines would assist practices in deciding whether to adopt DBT and in standardizing which patients should receive DBT. 670 SBI members responded to the survey.	Nov-16					X	X			
Digital Breast Tomosynthesis and the Challenges of Implementing an Emerging Breast Cancer Screening Technology Into Clinical Practice. Lee CI, Lehman CD - • J Am Coll Radiol. 2016 Nov;13(11S):R61-R66. doi: 10.1016/j.jacr.2016.09.029. **Published in 2013** ***Key Point:** Published in 2013, this article speaks to the potential of digital breast tomosynthesis by outlining the positive and negative effects of the adoption of this technology.	Nov-16						X			

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Position paper on screening for breast cancer by the European Society of Breast Imaging (EUSOBI) and 30 national breast radiology bodies from Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Israel, Lithuania, Moldova, The Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Spain, Sweden, Switzerland and Turkey. Sardanelli F, Aase HS, Álvarez M, Azavedo E, Baarslag HJ, Balleyguier C, Baltzer PA, Beslagic V, Bick U, Bogdanovic-Stojanovic D, Briediene R, Brkljacic B, Camps Herrero J, Colin C, Cornford E, Danes J, de Geer G, Esen G, Evans A, Fuchsjaeger MH, Gilbert FJ, Graf O, Hargaden G, Helbich TH, Heywang-Köbrunner SH, Ivanov V, Jónsson Á, Kuhl CK, Lisencu EC, Luczynska E, Mann RM, Marques JC, Martincich L, Mortier M, Müller-Schimpfle M, Ormandi K, Panizza P, Pediconi F, Pijnappel RM, Pinker K, Rissanen T, Rotaru N, Saguatti G, Sella T, Slobodníková J, Talk M, Taourel P, Trimboli RM, Vejborg I, Vourtsis A, Forrai G. - Eur Radiol. 2016 Nov 2. ***Key Point:** Digital mammography (not film-screen or computer radiography) should be used. DBT is set to become "routine mammography" in the screening setting in the next future.	Nov-16	X								
Mammography: an update of the EUSOBI recommendations on information for women Sardanelli F, Fallenberg EM, Clauser P, Trimboli RM, Camps-Herrero J, Helbich TH, Forrai G - European Society of Breast Imaging (EUSOBI), with language review by Europa Donna–The European Breast Cancer Coalition - Insights Imaging. 2016 Nov 16. ***Key Point:** Information about new mammographic technologies (tomosynthesis and contrast-enhanced spectral mammography). Digital breast tomosynthesis increases cancer detection and decreases the recall rate.	Nov-16	X	X	X		X				
Comparison of the diagnostic efficiency between digital breast tomosynthesis and full-field digital mammography. Cai S, Yan J, Cai D, Huang M, Yan L - Zhong Nan Da Xue Xue Bao Yi Xue Ban. 2016 Oct 28;41(10):1075-1081. **[Article in Chinese]** ***Key Point:** DBT has a high clinical significance in BI-RADS classification for breast X-ray examination.	Oct-16					X				
Breast density (BD) assessment with digital breast tomosynthesis (DBT): Agreement between Quantra™ and 5th edition BI-RADS®. Ekpo EU, Mello-Thoms C, Rickard M, Brennan PC, McEntee MF - Breast. 2016 Oct 18;30:185-190. doi: 10.1016/j.breast.2016.10.003. ***Key Point:** Data demonstrate moderate to substantial agreement in BD assessment between fifth edition BI-RADS® and Quantra™	Oct-16							X		

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Advances in Digital Breast Tomosynthesis. Hooley RJ, Durand MA, Philpotts LE - AJR Am J Roentgenol. 2016 Oct 27:1-11. ***Key Point:** This article reviews key features of DBT including technique, clinical implementation, and benign and malignant imaging findings. We will also present the benefits of DBT in screening, diagnostic workup, and image-guided biopsy.	Oct-16	X	X	X		X	X	X		X
Clinical performance of Siemens digital breast tomosynthesis versus standard supplementary mammography for the assessment of screen-detected soft-tissue abnormalities: a multi-reader study. Whelehan P, Heywang-Köbrunner S2, Vinnicombe SJ, Hacker A, Jänsch A, Hapca A, Gray R, Jenkin M, Lowry K, Oeppen R, Reilly M, Stahnke M, Evans A - Clin Radiol. 2016 Oct 10. pii: S0009-9260(16)30345-2. doi: 10.1016/j.crad.2016.08.011. ***Siemens tomo*** ***Key Point:** Siemens DBT demonstrates equivalent diagnostic accuracy according to ROC curve analysis when used in place of SMVs (supplementary mammographic views) in screen-detected soft-tissue mammographic abnormalities.	10/2016					X		X		
Systematic review of 3D mammography for breast cancer screening Hodgson R, Heywang-K€obrunner SH, Harvey SC, Edwards M, Shaikh J, Arber M, Glanville J - The Breast 27 (2016) 1e10 Published by Elsevier Ltd. ***Key Point:** US and European studies show that DBT + FFDM, compared to FFDM, yields higher invasive cancer detection rates, increasing the effectiveness of breast cancer screening. The use of DBT may reduce recalls and thereby reduce both program costs and distress caused by a false negative recall. **Summary Card**	Oct-16	X							X	
Assessment of the extent of microcalci!cations to predict the size of a ductal carcinoma in situ: comparison between tomosynthesis and conventional mammography Berger N, Schwizer SD, Varga Z, Rageth C, Frauenfelder T, Boss A. - Clin Imaging. 2016 Nov - Dec;40(6):1269-1273. doi: 10.1016/j.clinimag.2016.09.003. ***Key Point:** This retrospective study determined that DBT provides a slightly better estimation of the size of a DCIS than MG.	Sep-16					X				
Implementation of Synthesized Two-dimensional Mammography in a Population-based Digital Breast Tomosynthesis Screening Program Zuckerman SP, Conant EF, Keller B, Maidment ADA, Barufaldi B, Weinstein SP, Synnestvedt M, McDonald ES - radiology.rsna.org n Radiology: Volume 281: Number 3—December 2016 ***Key Point:** Screening with s2D/DBT allowed for the benefits of DBT with a decrease in radiation dose compared with digital mammography/DBT.	Aug-16	X			X					

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Comparison of the diagnostic performance of digital breast tomosynthesis and magnetic resonance imaging added to digital mammography in women with known breast cancers Kim WH, Chang JM, Moon HG, Yi A, Koo HR, Gweon HM, Moon WK - Eur Radiol. 2016 Jun;26(6):1556-64. doi: 10.1007/s00330-015-3998-3. Epub 2015 Sep 16. ***Key Point:** Digital breast tomosynthesis (DBT) plus mammography was compared with MRI plus mammography. DBT had lower sensitivity and higher PPV than MRI.	Jun-16					X				
Detection and characterization of breast lesions in a selective diagnostic population: diagnostic accuracy study for comparison between one-view digital breast tomosynthesis and two-view full-field digital mammography. Chae EY, Kim HH, Cha JH, Shin HJ, Choi WJ. - Br J Radiol. 2016 Jun;89(1062):20150743. doi: 10.1259/bjr. 20150743. ***Key Point:** In this study, a comparison between one-view DBT compared to two-view digital mammography, offered improved reader performance for detection and characterization of breast cancers.	Jun-16		X			X				
Effectiveness of Digital Breast Tomosynthesis Compared With Digital Mammography Outcomes Analysis from 3 Years of Breast Cancer Screening McDonald ES, Oustimov A, Weinstein SP, Synnestvedt MB, Schnall M, Conant E - JAMA Oncology, 2016 June 1;2(6):737-43 doi:10.1001/jamaoncol.2015.5536 ***Key Point:** Suggests 3D MAMMOGRAPHY™ screening exam outcomes were sustainable with significant reduction in patient recall, increasing cancer cases per recalled patients and a decline in interval cancers. **Summary Card**	06/2016	X	X		X	X				
Breast cancer screening with digital breast tomosynthesis. Skaane P - Breast Cancer. 2016 Apr 30. ***Key Point:** The retrospective and the prospective screening studies comparing FFDM and DBT have all demonstrated that tomosynthesis has a great potential for improving breast cancer screening. DBT should be regarded as a better mammogram that could improve or overcome limitations of the conventional mammography, and tomosynthesis might be considered as the new technique in the next future of breast cancer screening.	Apr-16	X								

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Breast cancer screening using tomosynthesis in combination with digital mammography compared to digital mammography alone: a cohort study within the PROSPR consortium. Conant EF, Beaber EF, Sprague BL, Herschorn SD, Weaver DL, Onega T, Tosteson AN, McCarthy AM, Poplack SP, Haas JS, Armstrong K, Schnall MD, Barlow WE. - Breast Cancer Res Treat (2016) 156:109–116 DOI 10.1007/s10549-016-3695-1 Clinical Trial ***Key Point:** The collected data supports implementation of DBT screening based on increased cancer detection, reduced recall, and no difference in false negative screening examinations.	Mar-16	X		X	X	X	X	X		
Breast cancer screening controversies: who, when, why, and how? Chetlen A, Mack J, Chan T - Clinical Imaging, Volume 40, Issue 2, March–April 2016, Pages 279-282 ***Key Point:** The article compares and contrasts screening mammography, tomosynthesis, whole-breast screening ultrasound, magnetic resonance imaging, and molecular breast imaging.	Mar-16	X	X							
Digital breast tomosynthesis (3D-mammography) screening: A pictorial review of screen-detected cancers and false recalls attributed to tomosynthesis in prospective screening trials Houssami N, LÃ¥ng K, Bernardi D, Tagliafico A, Zackrisson S, Skaane P. - Breast. 2016 Apr;26:119-34. doi: 10.1016/j.breast.2016.01.007. Review. ***Key Point:** This pictorial review prospecttive screeing trials the performed standard digital mammography and tomosynthesis in the same screening patients. It highlights cancers detected only at tomosynthesis screening and screens falsely recalled in the course of breast tomosynthesis screening, illustrating both true-positive (TP) and false-positive (FP) detection attributed to tomosynthesis.	Feb-16	X		X				X		
Digital breast tomosynthesis (DBT): a review of the evidence for use as a screening tool. Gilbert FJ, Tucker L, Young KC. - Clin Radiol. 2016 Feb;71(2):141-50. doi: 10.1016/j.crad.2015.11.008. Review. **UK** ***Key Point:** Prospective screening studies were reviewed and the authors agreed with the studies have demonstrated reduced recall rates and increased cancer detection, in the UK, cost effectiveness and feasibility studies are needed before implementation into the UK NHSBSP can be considered; however, this technology is undoubtedly an improvement on conventional 2D imaging.	Feb-16	X		X	X	X	X			

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Accuracy of GE digital breast tomosynthesis vs supplementary mammographic views for diagnosis of screen-detected soft-tissue breast lesions Cornford EJ, Turnbull AE, James JJ, Tsang R, Akram T, Burrell HC, Hamilton LJ, Tennant SL, Bagnall MJ, Puri S, Ball GR, Chen Y, Jones V. - Br J Radiol. 2016;89(1058):20150735. doi: 10.1259/bjr.20150735. **UK study on GE DBT** ***Key Point:** This study provides evidence for the use of the commercially available GE DBT system demonstrating that it is at least equivalent to supplementary mammographic views in the assessment of soft-tissue screen-detected abnormalities.	Jan-16					X				
Impact on the recall rate of digital breast tomosynthesis as an adjunct to digital mammography in the screening setting. A double reading experience and review of the literature. Carbonaro LA, Di Leo G, Clauser P, Trimboli RM, Verardi N, Fedeli MP, Girometti R, TafÃ A, Bruscoli P, Saguatti G, Bazzocchi M, Sardanelli F. - Eur J Radiol. 2016 Apr;85(4):808-14. doi: 10.1016/j.ejrad.2016.01.004. ***Key Point:** DBT was confirmed to reduce recall rates and was confirmed through double reading. DBT allows an increased inter-reader agreement.	Jan-16	X		X						
Supplemental Screening for Breast Cancer in Women With Dense Breasts: A Systematic Review for the U.S. Preventive Services Task Force. Melnikow J, Fenton JJ, Whitlock EP, Miglioretti DL, Weyrich MS, Thompson JH, Shah K. - Ann Intern Med. 2016 Feb 16;164(4):268-78. doi: 10.7326/M15-1789. **Review.** ***Key Point:** This systematic review evaluates the supplemental screening of women with dense breasts, which finds additional breast cancer but increases false-positive results. Use of DBT may reduce recall rates.	Jan-16	X		X						
Performance of one-view breast tomosynthesis as a stand-alone breast cancer screening modality: results from the MalmÃ¶ Breast Tomosynthesis Screening Trial, a population-based study. LÃ¥ng K, Andersson I, Rosso A, Tingberg A, Timberg P, Zackrisson S. - Eur Radiol. 2016 Jan;26(1):184-90. doi: 10.1007/s00330-015-3803-3. **Siemens** ***Key Point:** Over 10,000 screening exams from an urban Swedish population was investigated. The study found a significant increase in cancer detection rate when using one-view DBT as a stand-alone screening modality compared to two-view digital mammogram (DM).	Jan-16	X						X		

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Recall Rate Reduction with Tomosynthesis During Baseline Screening Examinations: An Assessment From a Prospective Trial Sumkin JH, Ganott MA, Chough DM, Catullo VJ, Zuley ML, Shinde DD, Hakim CM, Bandos AI, Gur D. - Acad Radiol. 2015 Dec;22(12):1477-82. doi: 10.1016/j.acra.2015.08.015. ***Key Point:** Large inter-reader variability in terms of recall reduction was observed among 14 readers; 11 of the 14 readers recalled fewer women using FFDM plue DBT.	Dec-15	X		X						
Variation in Screening Abnormality Rates and Follow-Up of Breast, Cervical and Colorectal Cancer Screening within the PROSPR Consortium Tosteson AN, Beaber EF, Tiro J, Kim J, McCarthy AM, Quinn VP, Doria-Rose VP, Wheeler CM, Barlow WE, Bronson M, Garcia M, Corley DA, Haas JS, Halm EA, Kamineni A, Rutter CM, Tosteson TD, Trentham-Dietz A, Weaver DL; PROSPR consortium. J Gen Intern Med. 2016 Apr;31(4):372-9. doi: 10.1007/s11606-015-3552-7. ***Key Point:** This study highlights the opportunity for improving the delivery of cancer screening through dedicated study of patient, provider, clinic, and health system characteristics associated with timely follow-up of screening abnormalities.	Dec-15	X					X			
Accuracy of Digital Breast Tomosynthesis for Depicting Breast Cancer Subgroups in a UK Retrospective Reading Study (TOMMY Trial) Gilbert FJ, Tucker L, Gillan MG, Willsher P, Cooke J, Duncan KA, Michell MJ, Dobson HM, Lim YY, Suaris T, Astley SM, Morrish O, Young KC, Duffy SW – Radiology. 2015 Dec; 277(3):697-706. doi: 10.1148/radiol.2015142566. ***Key Point:** Compared the diagnostic performance of digital mammography (DM), DM plus breast tomosynthesis (DM plus BT), and synthesized DM plus BT (sDM plus BT) for depicting malignant features in different subgroups of women invited for screening. **Summary Card**	Dec-15	X	X		X					
Digital Breast Tomosynthesis in the Diagnostic Setting: Indications and Clinical Applications Peppard HR, Nicholson, BE, Rochman CM, Merchant JK, Ray C. Mayo RC, Harvey JA RadioGraphics 2015; 35:975–990 - Published online 10.1148/rg.2015140204 ***Key Point:** The authors' experience shows that DBT can be implemented effectively in the diagnostic workflow to evaluate and localize potential lesions more efficiently. DBT may potentially replace conventional supplemental mammography at diagnostic workup and obviate ultrasonography in select cases.	Jul-15		X			X	X			
Appropriate Imaging for Breast Cancer: Final Findings & Decision Report Institute for Clinical and Economic Review/California Technology Assessment Forum April 2015.	Apr-15						X			

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Issues to Consider Before Implementing Digital Breast Tomosynthesis Into a Breast Imaging Practice Hardesty LA - AJR March 2015; 204:681–684 ***Key Point:** When appropriate attention is given to image acquisition, interpretation, storage, technologist and radiologist training, patient selection, billing, radiation dose, and marketing, implementation of DBT into a breast imaging practice can be successful.	Mar-15	X					X			
Value analysis of digital breast tomosynthesis for breast cancer screening in a commercially-insured US population Bonafede MM, Kalra VB, Miller JD, Fajardo LL - Journal of ClinicoEconomics and Outcomes Research. Jan 2015; 7:53-63 ***Key Point:** The results of this study demonstrate clinical and economic favorability of DBT for breast cancer screening among commercially-insured US women. Wider adoption of DBT mammography presents an opportunity to deliver value-based care in the US health care system.	Jan-15		X				X			
Screening Recalls after Tomosynthesis Mammography: Are Additional Mammographic Views Necessary? Geisel J, Andrejeva-Wright L, Raghu M, Durand M, Levesque P, Philpotts L – RSNA 2014 ***Key Point:** Authors conclude that following screening tomosynthesis, there may be no need for additional mammographic views. This will help in reducing costs, radiation, exposure and time.	Dec-14	X	X	X						
Comparison of Digital Mammography (FFDM) and FFDM Plus Digital Breast Tomosynthesis in Mammography Screening for Cancer Detection according to Breast Parenchyma Density. Skaane P, Osteras B, Eben E, Gullien R – Radiological Society of North America 2014 ***Key Point:** Authors conclude that combined digital mammography and tomosynthesis has the potential to significantly improve the cancer detection rate in screening women with BI-RADS density 2-4. **Summary Card**	Dec-14	X	X					X		
Recall Rate Reduction with Tomosynthesis during Baseline Screening Examinations – Assessment from a Prospective Screening Trial Sumkin J, Zuley M, Gur D – Radiological Society of North America 2014 ***Key Point:** Authors conclude that the addition of tomosynthesis to digital mammography during baseline screening resulted in 32% reduction in recall rate especially in density BI-RADS 2 and 3. The data also demonstrates that the addition of tomosynthesis to DM resulted in a substantially higher PPV3 in recalled women	Dec-14	X	X	X						

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Analysis of Cancers Missed on Digital Breast Tomosynthesis Zuley M, Koo J, Plecha D, Rose S, Benjamin J, Gur D, Bandos A, Sumkin J, Kelly A, Ganott M - Radiological Society of North America 2014 ***Key Point:** The authors conclude that the number of cancers detected with tomosynthesis imaging in CC view (78%) is significantly higher than in MLO view (47%). The authors also conclude that with tomosynthesis imaging in one or both views, all cancer types and at all locations may still be missed primarily in dense breasts because the cancers appear like normal tissue.	Dec-14					X				
The STORM II (Screening with Tomosynthesis or Mammography II) Trial: Interim Comparison of Screen-reading Strategies in Population Breast Screening Bernardi D, Pellegrini M, Valentini M, Fanto C, Houssami N - Radiological Society of North America 2014 ***Key Point:** The authors conclude integrated synthetic 2D with 3D MAMMOGRAPHY™ imaging had a comparable cancer detection compared to integrated standard 2D and 3D MAMMOGRAPHY™ imaging, thus reducing the radiation dose in patients undergoing tomosynthesis-based screening. **Summary Card**	Dec-14	X			X					
Comparison with Synthetic 2D Mammography Reconstructed from Digital Breast Tomosynthesis and Digital 2D Mammography for the Detection of T1 Breast Cancer Choi J, Han B, Ko E, Ko E, Hahn S - Radiological Society of North America 2014 ***Key Point:** The authors conclude that the diagnostic performance was similar for synthetic 2D mammography compared to digital 2D mammography. The authors also suggest that the use of synthetic mammogram may reduce the radiation dose in patients, since the results indicate that 2D mammography may not be necessary during the tomosynthesis-based screening.	Dec-14	X			X					
Whole Breast US after Screening Breast Tomosynthesis: Initial Experience (AB) Aguillar V, Ferreira V, Endo E, Dequi C, Giannotti D, Cerri G. - RSNA 2014 ***Key Point:** The authors conclude that the addition of hand-held whole breast ultrasonography (US) had no significant effect on the cancer detection rate after screening with breast tomosynthesis and US increased the number of biopsies, lowering the overall PPV.	Dec-14		X			X	X			

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Digital Breast Tomosynthesis-guided Vacuum-assisted Breast Biopsy: Initial Experiences and Comparison with Prone Stereotactic Vacuum-assisted Biopsy Schrading S, Distelmaier M, Dirrichs T, Detering S, Brolund L, Strobel K, Kuhl CK - Radiology. 2014 Nov 11:141397. [Epub ahead of print] PubMed PMID: 25386875. ***Key Point:** Digital breast tomosynthesis vacuum-assisted biopsy is an efficient and reliable way to localize and sample lesions, especially ones who mammographic appearance is low contrast and non-calcified.	Nov-14		X							X
Comparative Effectiveness of Combined Digital Mammography and Tomosynthesis Screening for Women with Dense Breasts (P) Lee CI, Cevik M, Alagoz O, Sprague BL, Tosteson AN, Miglioretti DL, Kerlikowske K, Stout NK, Jarvik JG, Ramsey SD, Lehman CD - Radiology. 2014 Oct 13:141237. PubMed PMID: 25350548 ***Key Point:** Combined biennial digital mammography and tomosynthesis screening in the U.S. of dense breasted women aged 50-74 years is cost effective. Also that adding tomosynthesis has the potential to decrease the number of unnecessary diagnostic work-ups and invasive procedures that result from false-positive screening findings which may balance the harm vs. benefit debate concerning breast cancer screening. **Summary Card**	Oct-14	X						X		
Effect of radiologists' experience on breast cancer detection and localization using digital breast tomosynthesis Alakhras MM, Brennan PC, Rickard M, Bourne R, Mello-Thoms C - Eur Radiol. 2014 Sep 6. PubMed PMID: 25192796 ***Key Point:** The authors conclude that the addition of DBT to DM improved radiologists' performance regardless of prior DBT experience; and both increased the number of cancers detected and led to more accurate localization of breast lesions. **Summary Card**	Sep-14							X		
Early Clinical Experience with Digital Breast Tomosynthesis for Screening Mammography Durand MA, Haas BM, Yao X, Geisel JL, Raghu M, Hooley RJ, Horvath LJ, Philpotts LE - Radiology. 2014 Sep 1:131319. PubMed PMID: 25188431 ***Key Point:** The authors conclude that the addition of tomosynthesis to conventional 2D mammography resulted in 37% reduction in recall rate compared conventional 2D mammography with no significant difference in the cancer detection rate. The reduction in recall rate was seen greatest for asymmetries and calcifications.	Sep-14			X		X				

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Changes in Recall Type and Patient Treatment Following Implementation of Screening Digital Breast Tomosynthesis Lourenco AP, Barry-Brooks M, Baird G, Tuttle A, Mainiero MB - Radiology. 2014 Sep 22:140317. PubMed PMID: 25247407 ***Key Point:** The study results demonstrate a 31% reduction in recall rate without a change in biopsy PPV or cancer detection rate after implementation of DBT. There were fewer recalls for asymmetries and more recalls for masses, calcifications, and areas of architectural distortion.	Sep-14			X						
A Reader Study Comparing Prospective Tomosynthesis Interpretations with Retrospective Readings of the Corresponding FFDM Examinations Rose SL, Tidwell AL, Ice MF, Nordmann AS, Sexton R Jr, Song R - Acad Radiol. 2014 Sep; 21(9):1204-10. doi: 10.1016/j. acra.2014.04.008. PubMed PMID: 25107868 ***Key Point:** The authors concluded that for screening asymptomatic women, the addition of DBT to FFDM resulted in significant improvements in both performance measures, namely a reduction of recall rate (34%) with a simultaneous increase in cancer detection rate, particularly invasive cancers (66%). **Summary Card**	Sep-14	X		X		X				
Clinical Performance Metrics of 3D Digital Breast Tomosynthesis Compared With 2D Digital Mammography for Breast Cancer Screening in Community Practice Greenberg J, Javitt M, Katzen J, Michael S, Holland A - AJR Am J Roentgenol: 203, Sept 2014 ***Key Point:** The authors concluded that patients screened with combined 2D/3D™ exams resulted in increases in cancer detection rate (for cancer overall and for invasive cancers) and also resulted in decreases in the recall rate. The results also demonstrated a significantly higher positive predictive value for recalls. **Summary Card**	Sep-14	X		X		X				
The accuracy of digital breast tomosynthesis compared with coned compression magnification mammography in the assessment of abnormalities found on mammography Morel JC, Iqbal A, Wasan RK, Peacock C, Evans DR, Rahim R, Goligher J, Michell MJ - Clin Radiol. 2014 Nov;69(11):1112-6. doi: 10.1016/j. rad.2014.06.005. Epub 2014 Aug 3. PubMed PMID: 25100302 ***Key Point:** The authors confirm that two-view mammography with one-view DBT is better is evaluating mammographic abnormalities compared to two-view mammography and CCMM. The data further demonstrates that DBT can be used effectively at screening and in symptomatic diagnostic practice for further evaluating these abnormalities.	Aug-14	X	X							

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Detection of mammographically occult architectural distortion on digital breast tomosynthesis screening: initial clinical experience Partyka L, Lourenco AP, Mainiero MB - AJR Am J Roentgenol. 2014 Jul; 203(1):216-22. doi: 10.2214/AJR.13.11047 ***Key Point:** Breast tomosynthesis can visualize architectural distortions (ADs) better than digital mammography (DM), and also can detect ADs that that are hidden on DM, thus increasing the cancer detection rate.	Jul-14	X				X				
Breast screening using 2D-mammography or integrating digital breast tomosynthesis (3D-mammography) for single-reading or double-reading - Evidence to guide future screening strategies Houssami N, Macaskill P, Bernardi D, Caumo F, Pellegrini M, Brunelli S, Tuttobene P, Bricolo P, Fantò C, Valentini M, Ciatto S - Eur J Cancer 2014 Jul; 50(10):1799-807 ***Key Point:** 3D MAMMOGRAPHY™ imaging was found to offer significantly higher cancer detection than 2D mammography using either single or double reading. The authors suggest that based on this evidence, screening practices may be made more effective by employing 3D MAMMOGRAPHY™ imaging rather than 2D mammography. **Summary Card**	Jul-14	X						X		
Digital breast tomosynthesis: lessons learned from early clinical implementation (P) Roth RG, Maidment AD, Weinstein SP, Roth SO, Conant EF - Radiographics. 2014 Jul-Aug; 34(4):E89-E102. doi: 10.1148/rg.344130087. PubMed PMID: 25019451 ***Key Point:** The authors conclude that the clinical implementation of digital breast tomosynthesis improves screening and diagnostic accuracy. The data shows a large education in recall rate with an increased cancer detection rate in the screening population. The data also shows enhanced conspicuity of lesions, especially architectural distortion and masses. The authors also conclude that diagnostic tomosynthesis can reduce the number of supplemental 2D imaging examinations (spot compressions and additional projections for localization) thus improving workflow.	Jul-14	X	X	X		X	X			

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Digital Breast Tomosynthesis: Lessons Learned from Early Clinical Implementation Gartner R, Maidment ADA, Susan P. Weinstein SP, Orel Roth S, Conant EF - RadioGraphics 2014; 34:E89–E102 - Published online 10.1148/4130087 ***Key Point:** CDBT has shown improved accuracy for screening and diagnostic breast imaging. One year after implementing DBT for all screening patients, it has demonstrated a substantial reduction in overall callback rate and a trend toward increased cancer detection. In diagnostic examinations, improved conspicuity of lesions with use of DBT, particularly for architectural distortion and masses. The use of DBT in the diagnostic setting can expedite workups by reducing the number of 2D images needed (ie, spot compressions and additional projections for localization).	Jul-14	X	X	X		X	X			
Breast Cancer Screening Using Tomosynthesis in Combination With Digital Mammography Friedewald S, Rafferty E, Rose S, Durand M, Plecha D, Greenberg J, Hayes M, Copit D, Carlson K, Cink T, Barke L, Greer L, Miller D, Conant E - JAMA. 2014; 311(24):2499-2507. doi:10.1001/jama.2014.6095 ***Key Point:** In this largest screening study involving over 450,000 examinations, the authors conclude that the addition of 3D MAMMOGRAPHY™ exams to 2D mammography demonstrated an increase in cancer detection rate and a decrease in the recall rate. The authors also conclude that the PPV3 improved by 21% after the introduction of tomosynthesis. **Summary Card**	Jun-14	X		X		X				
Effect of integrating 3D-mammography (digital breast tomosynthesis) with 2D-mammography on radiologists' true-positive and false-positive detection in a population breast screening trial Bernardi D, Caumo F, Macaskill P, Ciatto S, Pellegrini M, Brunelli S, Tuttobene P, Bricolo P, Fantò C, Valentini M, Montemezzi S, Houssami N Eur J Cancer. 2014 May; 50(7):1232-8 ***Key Point:** Variability in performance among radiologists using 2D mammography was also reflected in variability with the addition of 3D MAMMOGRAPHY™ exams, however there was less variability in true positive reads using 3D MAMMOGRAPHY™ imaging. The authors conclude that the addition of tomosynthesis to 2D conventional mammography either reduced the false positive rate or improved the cancer detection rate, with most readers achieving both improvements. **Summary Card**	May-14					X				

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Suspicious Breast Lesions Visible on Tomosynthesis and Occult on 2D Mammography: Imaging Features and Histology (AB) Butler R, Marx S, Durand M, Hooley R, Horvath L, Raghu M, Andrejeva L, Philpotts L Presented at the ARRS 2013, Scientific Session 27 - Breast Imaging ***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.	May-14	X	X							
Digital breast tomosynthesis in the analysis of fat-containing lesions Freer PE, Wang JL, Rafferty EA - Radiographics. 2014 Mar-Apr;34(2):343-58 ***Key Point:** Evaluation and classification of fat containing lesions using tomosynthesis differs from that using digital mammography.	Mar-14		X							
Accuracy of mammography, digital breast tomosynthesis, ultrasound and MR imaging in preoperative assessment of breast cancer Mariscotti G, Houssami N, Durando M, Bergamasco L, Campanino PP, Ruggieri C, Regini E, Luparia A, Bussone R, Sapino A, Fonio P, Gandini G Anticancer Res. 2014 Mar;34(3):1219-25 ***Key Point:** The authors conclude that performing MRI on patients who had been evaluated by DM with DBT and US had very little gain in sensitivity and no gain in overall accuracy. **Summary Card**	Mar-14		X	X			X			
Initial experience with combination digital breast tomosynthesis plus full field digital mammography or full field digital mammography alone in the screening environment Destounis S, Arieno A, Morgan R - J Clin Imaging Sci. 2014 Feb 25;4:9 ***Key Point:** The authors conclude that the addition of breast tomosynthesis to digital mammography significantly reduced the recall rate by ~63%	Feb-14			X						
Diagnostic accuracy and recall rates for digital mammography and digital mammography combined with one-view and two-view tomosynthesis: results of an enriched reader study Rafferty E, Park J, Philpotts L, Poplack S, Sumkin J, Halpern E, Niklason L - AJR Am J Roentgenol. 2014 Feb; 202(2):273-281 ***Key Point:** The authors conclude that the addition of one-view tomosynthesis to digital mammography improved the diagnostic accuracy and reduced the recall rate. However, the addition of two-view tomosynthesis to digital mammography resulted in twice the diagnostic performance gain at the same time further reducing the recall rate. Two-View 3D MAMMOGRAPHY™ imaging in combination with 2D had a large gain in diagnostic accuracy for imaging women with dense breasts; in fact the diagnostic accuracy for women with dense breasts was equivalent to 2D alone for women with nondense breasts. **Summary Card**	Feb-14			X		X				

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Two-View Digital Breast Tomosynthesis Screening with Synthetically Reconstructed Projection Images: Comparison with Digital Breast Tomosynthesis with Full-Field Digital Mammographic Images Skaane P, Bandos A, Eben E, Jebsen I, Krager M, Haakenaasen U, Ekseth U, Izadi M, Hofvind S, Gullien R - Radiology 2014 Jan 24:131391 ***Key Point:** The use of synthesized 2D images combined with DBT performed comparably to FFDM plus DBT when interpreting screening mammograms in terms of cancer detection rates and false-positive scores. The authors also conclude that the use of generated 2D images (Hologic's C-View™ software) constituted an average dose reduction of 45% while not resulting in any clinically meaningful differences in diagnostic accuracy. **Summary Card**	Jan-14	X	X	X	X					
Comparison of Two-dimensional Synthesized Mammograms versus Original Digital Mammograms Alone and in Combination with Tomosynthesis Images Zuley M, Guo B, Catullo V, Chough D, Kelly A, Lu A, Rathfon G, Spangler M, Sumkin J, Wallace L, and Bandos A - Radiology 2014 Jan 21:131530 ***Key Point:** The authors conclude that the use of synthetic mammograms whether alone or in combination with tomosynthesis has similar diagnostic accuracy and may eliminate the need for FFDM in a routine clinical study. The authors also conclude that the use of synthetic mammograms reduces the radiation dose in patients that are undergoing tomosynthesis based screening mammography. **Summary Card**	Jan-14	X			X					
Comparison of tomosynthesis plus digital mammography and digital mammography alone for breast cancer screening Haas BM, Kalra V, Geisel J, Raghu M, Durand M, Philpotts L - Radiology 2013 Dec;269(3):694-700 ***Key Point:** In this study, 13,158 screening mammography examinations and 6,100 combo examinations were retrospectively review. 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, ~50%) along with an increase in the cancer detection rate (9.5% overall) after the introduction of tomosynthesis in the clinical practice. **Summary Card**	Dec-13	X		X						

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Implementing Digital Breast Tomosynthesis (DBT) in a Screening Population: PPV1 as a Measure of Outcome Conant E, Wan F, Thomas M, Synnestvedt M, Weinstein S, Roth S, Kontos D, McCarthy A, Mitra N - Radiological Society of North America 2013, SSK01-02 ***Key Point:** The implementation of tomosynthesis in a large screening program demonstrated a reduction in recall rates and an increase in cancer detection rates that varied by reader. The screening outcomes for each reader, as measured by PPV1, showed significant improvements for 5 of 6 readers and stability for 1 reader.	Dec-13	X		X		X				
Imaging and Histopathology Findings of Breast Lesions Detected by Tomosynthesis Fajardo L, Limin Yang L, Park J - Radiological Society of North America 2013, SSK01-08 ***Key Point:** 50 biopsy recommendations were made in 4350 women that underwent screening from September 2012 to March 2013, including 15 biopsies in 2,610 women choosing to undergo tomosynthesis as part of their screening exam. 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	Dec-13					X				
Comparison of Lesion Detection and Characterization in Invasive Cancers Using Breast Tomosynthesis versus Conventional Mammography Dang P, Humphrey K, Freer P, Halpern E, Saksena M, Rafferty E - Radiological Society of North America 2013, SSE02-03 ***Key Point:** 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. **Summary Card**	Dec-13		X			X				
Tomosynthesis in Breast Cancer Visualization as a Function of Mammographic Density Butler R, Ostrover R, Hooley R, Geisel J, Raghu M, Philpotts L - Radiological Society of North America 2013, SSE02-04 ***Key Point:** In this study, 246 cancers (in 201 women) imaged with the combo mode (Tomo plus 2D mammography) that were diagnosed between 10/3/2011 and 1/16/2013 were reviewed by 7 radiologists. Tomosynthesis imaging is especially beneficial for visualizing non-calcification breast cancers in 80% women with scattered and heterogeneously dense breasts. It is also better in visualizing lesions associated with architectural distortion, invasive lobular histology that is difficult to detect and in visualizing small tumors.	Dec-13		X			X				

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Digital Breast Tomosynthesis in Diagnostic Mammography: Can Tomo Affect the Final Assessment Categories? Raghu M, Hooley R, Philpotts L, Geisel J, Durand M, Andrejeva-Wright L, Horvath L, Butler R - Radiological Society of North America 2013, SSE02-06 ***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.	Dec-13		X	X		X				
Comparative Study with Digital Mammography (DM) vs. DM Combined with Digital Breast Tomosynthesis (DBT) for the Detection of Invasive Lobular Carcinoma (ILC) Mariscotti G, Durando M, Martincich L, Caramia E, Campanino P, Luparia A, Bergamasco L, Fonio P, Gandini G - Radiological Society of North America 2013, SSE02-02 ***Key Point:** Six radiologists retrospectively interpreted 56 examinations of women. 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. DBT + DM demonstrated an increase in cancer detection rate and a decrease in the recall rate. The authors also conclude that the PPV3 improved by 21% after the introduction of tomosynthesis.	Dec-13		X	X		X				
Imaging and Histopathology Findings of Breast Lesions Detected by Tomosynthesis Fajardo L, Limin Yang L, Park J - Radiological Society of North America 2013, SSK01-08 ***Key Point:** 50 biopsy recommendations were made in 4350 women that underwent screening from September 2012 to March 2013, including 15 biopsies in 2,610 women choosing to undergo tomosynthesis as part of their screening exam. 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.	Dec-13		X			X				
How Tomosynthesis Optimizes Patient Work Up, Throughput, and Resource Utilization Philpotts L, Kalra V, Crenshaw J, Butler R - Radiological Society of North America 2013, SSK01-09 ***Key Point:** 11,101 screening and 5,357 diagnostic exams were performed for an overall increase to 16,438 total exams. The authors conclude that the addition of tomosynthesis resulted in fewer images per diagnostic case which resulted in faster patient diagnostic workup and better patient throughput and resource utilization.	Dec-13		X	X			X			

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Trends in Time to Interpretation of Tomosynthesis Based Screening Examinations with Increasing Experience (AB) Skaane P, Eben E, Jebsen I, Haakenaasen U, Krager M, Izadi M, Jahr G, Ekseth U - Presented at RSNA 2013, SSK01-04 Breast Imaging (Digital Breast Tomosynthesis Screening Outcomes) ***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. **Summary Card**	Dec-13	X					X			
Prospective trial comparing full-field digital mammography (FFDM) versus combined FFDM and tomosynthesis in a population-based screening programme using independent double reading with arbitration Skaane P, Bandos AI, Gullien R, Eben EB, Ekseth U, Haakenaasen U, Izadi M, Jebsen IN, Jahr G, Krager M, Hofvind S - Eur Radiol. 2013 Aug;23(8):2061-71 ***Key Point:** 2D and 3D™ imaging were performed during the first year on 12,629 consenting women. The study results demonstrated that double reading of 2D plus 3D™ imaging significantly improves cancer detection rate compared to 2D alone during mammographic screening. **Summary Card**	Aug-13	X								
Integration of 3D digital mammography with tomosynthesis for population breast-cancer screening (STORM): a prospective comparison study Ciatto S, Houssami N, Bernardi D, Caumo F, Pellegrini M, Brunelli S, Tuttobene P, Bricolo P, Fantò C, Valentini M, Montemezzi S, Macaskill P - Lancet Oncol. 2013 Jun; 14(7):583-9 ***Key Point:** Integrated 2D and 3D MAMMOGRAPHY™ exams significantly improves breast-cancer detection and has the potential to reduce false positive recalls. Twenty of the 59 cancers detected were visible only after the addition of tomosynthesis. Cancer detection increased 51% across all ages and breast densities for integrated 2D and 3D MAMMOGRAPHY™ exams compared to 2D mammography. **Summary Card**	Jun-13					X				
Implementation of breast tomosynthesis in a routine screening practice: an observational study Rose SL, Tidwell AL, Bujnoch LJ, Kushwaha AC, Nordmann AS, Sexton R Jr - AJR Am J Roentgenol. 2013 Jun;200(6):1401-8 ***Key Point:** The study results demonstrated a significant reduction in recall rates (~37%) along with a non-significant increase in the cancer detection rate (35% overall, 54% for invasive cancers) after the introduction of tomosynthesis in the clinical practice. These improvements were distributed over all breast density categories. **Summary Card**	Jun-13	X		X						

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Comparison of digital mammography alone and digital mammography plus tomosynthesis in a population-based screening program Skaane P, Bandos AI, Gullien R, Eben EB, Ekseth U, Haakenaasen U, Izadi M, Jebsen IN, Jahr G, Krager M, Niklason LT, Hofvind S, Gur D - Radiology 2013 Apr; 267(1):47-56 ***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. **Summary Card**	Apr-13	X				X				
One-View Versus Two-View Tomosynthesis: A Comparison of Breast Cancer Visibility in the Mediolateral Oblique and Craniocaudal Views Beck N, Butler R, Durand M, Andrejeva L, Hooley R, Horvath L, Raghu M, Philpotts L - American Roentgen Ray Society April 2013., 177, SS 27 ***Key Point:** The study included 106 patients who received both 2D mammography and tomosynthesis in both the views (mediolateral oblique and craniocaudal) in one year in both screening and diagnostic setting. 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. **Summary Card**	Apr-13	X	X							
The role of additional tomosynthesis combined with digital mammography Martínez P, Echano J, Sainz M, Simon I, Viteri G, Garcia Lallana A, Minguillon C, Pina L - European Congress of Radiology annual meeting, Vienna, Austria, March 2013, B-0809, SS 1702 ***Key Point:** 9301 combo studies were retrospectively reviewed. The study concludes that the addition of DBT to conventional 2D screening mammography increases the cancer detection rate by 61%. No statistical differences were found among the three density patterns, so tomosynthesis can be useful not only in dense patterns but also in pattern 2. **Summary Card**	Mar-13	X				X				
Can digital breast tomosynthesis replace conventional diagnostic mammography views for screening recalls without calcifications? A comparison study in a simulated clinical setting Brandt KR, Craig DA, Hoskins TL, Henrichsen TL, Bendel EC, Brandt SR, Mandrekar J - AJR Am J Roentgenol. 2013 Feb;200(2):291-8 ***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.	Feb-13		X	X						

HOLOGIC
The Science of Sure

3D MAMMOGRAPHY™

Clinical Papers

	Date	Screening	Diagnostic	Recall Rates	Dose	Outcomes	Economics	Cancer Detection	Interval Cancers	Biopsy
Assessing radiologist performance using combined digital mammography and breast tomosynthesis compared with digital mammography alone: results of a multicenter, multireader trial (P) Rafferty EA, Park JM, Philpotts LE, Poplack SP, Sumkin JH, Halpern EF, Niklason LT - Radiology. 2013 Jan;266(1):104-13. doi: 10.1148/radiol.12120674 ***Key Point:** Radiologist performance for diagnostic accuracy and recall rate significantly improved for with the addition of tomosynthesis to digital mammography.	Jan-13			X		X				
Digital breast tomosynthesis versus supplemental diagnostic mammographic images for evaluation of non-calcified breast lesions Zuley ML, Bandos AI, Ganott MA, Sumkin JH, Kelly AE, Catullo VJ, Rathfon GY, Lu AH, Gur D - Radiology 2013 Jan; 266(1): 89-95 ***Key Point:** Tomosynthesis significantly improved diagnostic accuracy for non-calcified lesions compared to supplemental mammographic views.	Jan-13		X	X						
Cost-Effectiveness of Digital Breast Tomosynthesis Kalra V, Haas B, Forman H, Philpotts L - Radiological Society of North America 2012, LL-BRS-WE5C ***Key Point:** Combined DBT had 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.	Dec-12	X		X			X			
A comparison of the accuracy of film-screen mammography, full-field digital mammography, and digital breast tomosynthesis Michell MJ, Iqbal A, Wasan RK, Evans DR, Peacock C, Lawinski CP, Douiri A, Wilson R, Whelehan P - Clin Radiol. 2012 Oct;67(10):976-81 ***Key Point:** The addition of tomosynthesis improved the diagnostic accuracy in the assessment of screen detected soft tissue lesions compared to full-field digital mammography and film-screen mammography combined and film-screen mammography alone. **Summary Card**	Oct-12	X	X							
Digital breast tomosynthesis (DBT): initial experience in a clinical setting Skaane P, Gullien R, Bjørndal H, Eben EB, Ekseth U, Haakenaasen U, Jahr G, Jebsen IN, Krager M - Acta Radiol. 2012 Jun 1;53(5):524-9 ***Key Point:** The authors studied the performance of tomosynthesis in imaging work-up and found the potential for increasing sensitivity, especially for cancers manifesting as spiculated masses and distortions. **Summary Card**	Jun-12		X			X				