Evidence Table – Position Verification

| # | Screening# | Full Reference | 2D | 2D-2D | 3D | SGRT | Other | Modalities evaluated | Sample size | Aim |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 01 | Hwang JM, Hung JY, Tseng YH, Chang YK, Wang YN, Chang CS. Use of electronic portal images to evaluate setup error and intra-fraction motion during free-breathing breast IMRT treatment. Medical Dosimetry. 2019 Sep 1;44(3):233-8. | N | Y | N | N | N | 1 | 33 | Before delivering of intensity-modulated radiotherapy, kilo-voltage image-guidance radiotherapy is widely used in setup error correction and monitoring intra-fraction motion effectively. Accordingly, this study proposes and tests an image integration technique for observing intra-fraction motion during beam de- livery, with the wider objective of reducing both image-guidance time and the dose delivered to nor- mal breast tissue. |
| 2 | 02 | Miyahara K, Kuroda M, Yoshimura Y, Aoyama H, Oita M, Sugianto I, Matsuzaki H, Ihara H, Katayama N, Katsui K, Kanazawa S. Evaluation of Setup Errors at the Skin Surface Position for Whole Breast Radiotherapy of Breast Cancer Patients. Acta Medica Okayama. 2018;72(4):331-6. | Y | N | N | N | N | 1 | 66 | We used image-processing software to analyze the setup errors at the skin surface position of breast cancer patients (n=66) who underwent post-operative whole breast irradiation at our hospital in 2014-2015. The sixty-six digital reconstructed radiographs (DRR) were created at the treatment planning for each patient |
| 3 | 03 | Wei X, Liu M, Ding Y, Li Q, Cheng C, Zong X, Yin W, Chen J, Gu W. Setup errors and effectiveness of Optical Laser 3D Surface imaging system (Sentinel) in postoperative radiotherapy of breast cancer. Scientific Reports. 2018 May 8;8(1):1-7. | N | N | Y | Y | N | 2 | 27 | The aim of this study was to compare the setup accuracy of optical surface imaging by the Sentinel system with cone-beam computerized tomography (CBCT) imaging currently used in our clinic for patients received BCS |
| 4 | 04 | Jensen CA, Roa AM, Johansen M, Lund JÅ, Frengen J. Robustness of VMAT and 3DCRT plans toward setup errors in radiation therapy of locally advanced left-sided breast cancer with DIBH. Physica Medica. 2018 Jan 1;45:12-8. | N | Y | N | N | N | 1 | 20 | Evaluate and compare the robustness of treatment plans produced using the volumetric modulated arc-therapy (VMAT) and the standard three-dimensional conformal radiotherapy (3DCRT) techniques by estimating perturbed doses induced by localization offsets for deep inspiration breathhold (DIBH) in locally advanced breast cancer radiation therapy |
| 5 | 05 | Sá AC, Fermento A, Neves D, Ferreira S, Silva T, Coelho CM, Vaandering A, Roma A, Quaresma S, Bonnarens E. Radiotherapy setup displacements in breast cancer patients: 3D surface imaging experience. Reports of Practical Oncology and Radiotherapy. 2018;23(1):61-7. | N | N | Y | Y | N | 2 | 20 | In this study, we intend to compare two different setup procedures for female breastcancer patients (CBCT and SGRT) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 06 | Hirata K, Yoshimura M, Mukumoto N, Nakamura M, Inoue M, Sasaki M, Fujimoto T, Yano S, Nakata M, Mizowaki T, Hiraoka M. Three-dimensional intrafractional internal target motions in accelerated partial breast irradiation using three-dimensional conformal external beam radiotherapy. Radiotherapy and Oncology. 2017 Jul 1;124(1):118-23. | N | Y | N | N | N | 1 | 23 | We evaluated three-dimensional intrafractional target motion, divided into respiratory-induced motion and baseline drift, in accelerated partial breast irradiation (APBI). |
| 7 | 07 | Jensen CA, Acosta Roa AM, Lund JÅ, Frengen J. Intrafractional baseline drift during free breathing breast cancer radiation therapy. Acta oncologica. 2017 May 4;56(6):867-73. | Y | N | N | N | N | 1 | 20 | This study aims to measure baseline drift and its incidence in free-breathing BCRT patients using an in-house developed laser system for tracking the position of the sternum. |
| 8 | 08 | Acharya S, Fischer-Valuck BW, Mazur TR, Curcuru A, Sona K, Kashani R, Green O, Ochoa L, Mutic S, Zoberi I, Li HH. Magnetic resonance image guided radiation therapy for external beam accelerated partial-breast irradiation: evaluation of delivered dose and intrafractional cavity motion. International Journal of Radiation Oncology* Biology* Physics. 2016 Nov 15;96(4):785-92. | N | N | N | N | Y | 1 | 30 | To use magnetic resonance image guided radiation therapy (MR-IGRT) for accelerated partial-breast irradiation (APBI) to (1) determine intrafractional motion of the breast surgical cavity; and (2) assess delivered dose versus planned dose. |
| 9 | 10 | Van Heijst TC, Philippens ME, Charaghvandi RK, Den Hartogh MD, Lagendijk JJ, van den Bongard HD, Van Asselen B. Quantification of intra-fraction motion in breast radiotherapy using supine magnetic resonance imaging. Physics in Medicine & Biology. 2016 Jan 21;61(3):1352. | N | N | N | N | Y | 1 | 21 | The goal of this study was to quantify intra-fraction motion using MRI scans from 21 breast-cancer patients, before and after BCS, in supine RT position, on two time scales |
| 10 | 11 | Barbés B, Azcona JD, Prieto E, de Foronda JM, García M, Burguete J. Development and clinical evaluation of a simple optical method to detect and measure patient external motion. Journal of applied clinical medical physics. 2015 Sep;16(5):306-21. | N | N | N | Y | N | 1 | 23 | In this work a novel method of motion tracking, with high accuracy, speed, and sensitivity, was devised and tested. |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 12 | Jones S, Fitzgerald R, Owen R, Ramsay J. Quantifying intra- and inter-fractional motion in breast radiotherapy. Journal of medical radiation sciences. 2015 Mar;62(1):40-6. | Y | N | N | N | N | 1 | 10 | The magnitude of intra- and inter-fractional variation in the set up of breast cancer patients treated with tangential megavoltage photon beams was investigated using an electronic portal imaging device (EPID). |
| 12 | 13 | Lutz CM, Poulsen PR, Fledelius W, Offersen BV, Thomsen MS. Setup error and motion during deep inspiration breath-hold breast radiotherapy measured with continuous portal imaging. Acta Oncologica. 2016 Feb 1;55(2):193-200. | Y | N | N | N | N | 1 | 58 | In this study, continuous portal imaging during treatment delivery was used to determine the treatment accuracy and residual motion for breast cancer treatments in external marker-guided deep inspiration breath-hold (DIBH) with daily image-guided radiotherapy (IGRT ) setup |
| 13 | 14 | Strom EA, Amos RA, Shaitelman SF, Kerr MD, Hoffman KE, Smith BD, Tereffe W, Stauder MC, Perkins GH, Amin MD, Wang X. Proton partial breast irradiation in the supine position: Treatment description and reproducibility of a multibeam technique. Practical radiation oncology. 2015 Jul 1;5(4):e283-90. | N | Y | N | N | N | 1 | 33 | We report an approach to multibeam proton APBI using a universally available supine setup and deliberate beam arrangement strategy to limit the total area of skin receiving a full dose while being robust for interfraction variation. |
| 14 | 15 | Chung MJ, Lee GJ, Suh YJ, Lee HC, Lee SW, Jeong S, Lee JW, Kim SH, Kang DG, Lee JH. Setup error and effectiveness of weekly image-guided radiation therapy of TomoDirect for early breast cancer. Cancer Research and Treatment: Official Journal of Korean Cancer Association. 2015 Oct;47(4):774. | N | N | Y | N | N | 1 | 147 | This study analyzes patient setup error in TomoDirect treatment and assesses risk factors associated with extensive setup errors. Additionally, we investigated effectiveness of weekly IGRT. |
| 15 | 17 | Zhang R, Andreozzi JM, Gladstone DJ, Hitchcock WL, Glaser AK, Jiang S, Pogue BW, Jarvis LA. Cherenkoscopy based patient positioning validation and movement tracking during post-lumpectomy whole breast radiation therapy. Physics in Medicine & Biology. 2014 Dec 12;60(1):L1. | N | N | N | N | Y | 1 | 12 | In this work, video imaging of Cherenkov emission was captured by a time domain gated system for a clinical trial of patients undergoing post-lumpectomy whole breast irradiation. Images from different treatment sessions were registered to the average image to calculate discrepancies in patient positioning and then compared to the tolerance value preset in the AlignRT system. |
| 16 | 18 | Feng CH, Gerry E, Chmura SJ, Hasan Y, Al-Hallaq HA. An image-guided study of setup reproducibility of postmastectomy breast cancer patients treated with inverse-planned intensity modulated | N | Y | Y | N | N | 2 | 21 | Our goals in this study were: (1) to calculate an appropriate PTV margin for chest wall and nodal targets using orthogonal kilovolt (kV) image data; and (2) to study residual setup error after daily kValignment using volumetric cone-beam computed tomography (CBCT) data |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | radiation therapy. International Journal of Radiation Oncology* Biology* Physics. 2015 Jan 1;91(1):58-64. | | | | | | | | |
| 17 | 19 | Laaksomaa M, Kapanen M, Skyttä T, Peltola S, Hyödynmaa S, Kellokumpu-Lehtinen PL. Estimation of optimal matching position for orthogonal kV setup images and minimal setup margins in radiotherapy of whole breast and lymph node areas. Reports of Practical Oncology and Radiotherapy. 2014;19(6):369-75. | N | Y | N | N | N | 1 | 50 | In this study, we investigated residual position errors in the tangential treatment field images when the orthogonal setup images were aligned in different ways. |
| 18 | 20 | Thomsen MS, Harrov U, Fledelius W, Poulsen PR. Inter- and intra-fraction geometric errors in daily image-guided radiotherapy of free-breathing breast cancer patients measured with continuous portal imaging. Acta oncologica. 2014 Jun 1;53(6):802-8. | Y | Y | N | N | N | 2 | 16 | The current study evaluates the accuracy of daily image-pair based IGRT for breast cancer by continuous portal imaging at both tangential fi elds at all fractions in the treatment course. |
| 19 | 22 | Yue NJ, Goyal S, Kim LH, Khan A, Haffty BG. Patterns of intrafractional motion and uncertainties of treatment setup reference systems in accelerated partial breast irradiation for right-and left-sided breast cancer. Practical radiation oncology. 2014 Jan 1;4(1):6-12. | Y | N | N | N | N | 1 | 33 | This study investigated the patterns of intrafractional motion and accuracy of treatment setup strategies in 3-dimensional conformal radiation therapy of accelerated partial breast irradiation (APBI) for right- and left-sided breast cancers. |
| 20 | 26 | Yang, D., Yoon, W., Chung, S. et al. Set-up uncertainty during breast radiotherapy. Strahlenther Onkol 189, 315–320 (2013). | Y | N | N | N | N | 1 | 174 | To establish the customized strategy of IGRT for whole breast irradiation, our study measured the set-up errors and assessed risk factors associated with extensive errors in our large population with radiotherapy based on tangential beam directions. |
| 21 | 29 | Harris EJ, Donovan EM, Coles CE, de Boer HC, Poynter A, Rawlings C, Wishart GC, Evans PM. How does imaging frequency and soft tissue motion affect the PTV margin size in partial breast and boost radiotherapy?. Radiotherapy and Oncology. 2012 May 1;103(2):166-71. | N | Y | N | N | N | 1 | 36 | This study investigates (i) the effect of verification protocols on treatment accuracy and PTV margins for partial breast and boost breast radiotherapy with short fractionation schema (15 fractions), (ii) the effect of deformation of the excision cavity (EC) on PTV margin size, (iii) the imaging dose required to achieve specific PTV margins. |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 22 | 32 | Park CK, Pritz J, Zhang GG, Forster KM, Harris EE. Validating fiducial markers for image-guided radiation therapy for accelerated partial breast irradiation in early-stage breast cancer. International Journal of Radiation Oncology* Biology* Physics. 2012 Mar 1;82(3):e425-31. | N | Y | N | N | N | 1 | 26 | In this prospective clinical trial, we evaluated intrafraction and interfraction respiratory motion, fiducial stability and the relationship of fiducial location to set up variation to develop parameters for a fiducial-based IGRT treatment regiment for APBI. |
| 23 | 35 | Li S, DeWeese T, Movsas B, Frassica D, Liu D, Kim J, Chen Q, Walker E. Initial validation and clinical experience with 3D optical-surface-guided whole breast irradiation of breast cancer. Technology in cancer research & treatment. 2012 Feb;11(1):57-68. | Y | N | N | Y | N | 2 | 30 | We had introduced 3D optical surface-guided radiotherapy (SGRT) of the breast cancer (BC). We then initiated the feasibility, accuracy, and precision studies of stereovision in detection of any breast displacement through the course of treatment for total thirty breasts undertaken whole breast irradiation (WBI). |
| 24 | 36 | Chadha M, Young A, Geraghty C, Masino R, Harrison L. Image guidance using 3D-ultrasound (3D-US) for daily positioning of lumpectomy cavity for boost irradiation. Radiation Oncology. 2011 Dec;6(1):1-1. | N | N | N | N | Y | 1 | 20 | The objectives of this initial pilot study were to evaluate the feasibility of adding a 3DUS IGRT procedure in the therapy room to reproducibly acquire quality images of the lumpectomy site, to record the interfractional shifts needed to correct for boost target motion, and establish a role for routine clinical application of IGRT in the treatment of breast cancer. |
| 25 | 38 | Lozano EM, Pérez LA, Torres J, Carrascosa C, Sanz M, Mendicote F, Gil A. Correction of systematic set-up error in breast and head and neck irradiation through a no-action level (NAL) protocol. Clinical and Translational Oncology. 2011 Jan;13(1):34-42. | N | Y | N | N | N | 1 | 40 | The main goal of this study was to evaluate an off-line no-action level (NAL) correction protocol to reduce systematic set-up errors in breast and head and neck cancer patients. A secondary goal was to estimate the margin reduction achievable after systematic error correction. |
| 26 | 39 | Deantonio L, Masini L, Loi G, Gambaro G, Bolchini C, Krengli M. Detection of setup uncertainties with 3D surface registration system for conformal radiotherapy of breast cancer. Reports of Practical Oncology and Radiotherapy. 2011;16(3):77-81. | Y | N | N | Y | N | 2 | 15 | In the present study, we investigated a method for verifying and correcting treatment setup errors using a 3D surface imaging system installed in the treatment room to facilitate image-guided radiotherapy in breast cancer patients. |
| 27 | 40 | Van Mourik A, Van Kranen S, Den Hollander S, Sonke JJ, van Herk M, van Vliet-Vroegindeweij C. Effects of setup errors and shape changes on breast radiotherapy. International Journal of Radiation Oncology* | N | N | Y | N | N | 1 | 19 | The purpose of the present study was to quantify the robustness of the dose distributions from three whole-breast radiotherapy (RT) techniques involving different levels of intensity modulation against whole patient setup inaccuracies and breast shape changes. |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Biology* Physics. 2011 Apr 1;79(5):1557-64. | | | | | | | | |
| 28 | 41 | Yue NJ, Goyal S, Zhou J, Khan AJ, Haffty BG. Intrafractional target motions and uncertainties of treatment setup reference systems in accelerated partial breast irradiation. International Journal of Radiation Oncology* Biology* Physics. 2011 Apr 1;79(5):1549-56. | N | Y | N | N | N | 1 | 21 | This study investigated the magnitude of intrafractional motion and level of accuracy of various setup strategies in accelerated partial breast irradiation (APBI) using three-dimensional conformal external beam radiotherapy. |
| 29 | 43 | Topolnjak R, Sonke JJ, Nijkamp J, Rasch C, Minkema D, Remeijer P, van Vliet-Vroegindeweij C. Breast patient setup error assessment: comparison of electronic portal image devices and cone-beam computed tomography matching results. International Journal of Radiation Oncology* Biology* Physics. 2010 Nov 15;78(4):1235-43. | Y | N | Y | N | N | 2 | 20 | To quantify the differences in setup errors measured with the cone-beam computed tomography (CBCT) and electronic portal image devices (EPID) in breast cancer patients. |
| 30 | 44 | Mitchell J, Formenti SC, DeWyngaert JK. Interfraction and intrafraction setup variability for prone breast radiation therapy. International Journal of Radiation Oncology* Biology* Physics. 2010 Apr 1;76(5):1571-7. | Y | N | N | N | N | 1 | 10 | To report the interfraction and intrafraction setup variation for prone breast radiotherapy and to determine an appropriate clinical tumor volume (CTV) to planning target volume (PTV)_ margin to account for motion and positional uncertainties. |
| 31 | 48 | Jain P, Marchant T, Green M, Watkins G, Davies J, McCarthy C, Loncaster J, Stewart A, Magee B, Moore C, Price P. Inter-fraction motion and dosimetric consequences during breast intensity-modulated radiotherapy (IMRT). Radiotherapy and oncology. 2009 Jan 1;90(1):93-8. | Y | N | Y | N | N | 2 | 10 | We used daily cone-beam CT (CBCT) imaging to assess inter-fraction motion during breast IMRT and its subsequent impact on IMRT and standard RT dose homogeneity. |
| 32 | 50 | Lawson JD, Fox T, Elder E, Nowlan A, Davis L, Keller J, Crocker I. Early clinical experience with kilovoltage image-guided radiation therapy for interfraction motion management. Medical | N | Y | N | N | N | 1 | 117 | Integrating a kV imaging unit with a traditional LINAC allows daily matching of kV images to planning digitally reconstructed radiographs (DRRs), which has significant potential advantages compared to traditional weekly MV verification films. Our aim was to assess the implementation of this system as well as to analyze the significance of calculated deviations from the intended isocenter. |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Dosimetry. 2008 Dec 1;33(4):268-74. | | | | | | | | |
| 33 | 52 | Krishna Murthy K, Al-Rahbi Z, Sivakumar SS, Davis CA, Ravichandran R. Verification of setup errors in external beam radiation therapy using electronic portal imaging. Journal of Medical Physics. 2008;33(2):49-53. | Y | N | N | N | N | 1 | 60 | The objective of the present study was to conduct an audit on QA aspects of treatment delivery, verification of the treatment field□s position on different days, and to document the efficacy of immobilization methods and reproducibility of treatment fields on various orientations in beam-directed radiotherapy using EPIDs. |
| 34 | 54 | Gierga DP, Riboldi M, Turcotte JC, Sharp GC, Jiang SB, Taghian AG, Chen GT. Comparison of target registration errors for multiple image-guided techniques in accelerated partial breast irradiation. International Journal of Radiation Oncology* Biology* Physics. 2008 Mar 15;70(4):1239-46. | N | Y | N | Y | N | 2 | 12 | In this study, the target registration errors were quantified for several setup techniques used in external beam partial breast irradiation. The TRE was determined for standard breast setup using lasers and patient tattoos, bony anatomy chest wall alignment, kV X-ray imaging of implanted clips, and a video-based 3D surface alignment system. |
| 35 | 55 | Kinoshita R, Shimizu S, Taguchi H, Katoh N, Fujino M, Onimaru R, Aoyama H, Katoh F, Omatsu T, Ishikawa M, Shirato H. Three-dimensional intrafractional motion of breast during tangential breast irradiation monitored with high-sampling frequency using a real-time tumor-tracking radiotherapy system. International Journal of Radiation Oncology* Biology* Physics. 2008 Mar 1;70(3):931-4. | Y | N | N | N | N | 1 | 17 | The purpose of this study was to evaluate the 3D intrafraction magnitudes of respiratory motion of the breast precisely with a high-sampling frequency |
| 36 | 56 | Fatunase T, Wang Z, Yoo S, Hubbs JL, Prosnitz RG, Yin FF, Marks LB. Assessment of the residual error in soft tissue setup in patients undergoing partial breast irradiation: results of a prospective study using cone-beam computed tomography. International Journal of Radiation Oncology* Biology* Physics. 2008 Mar 15;70(4):1025-34. | N | Y | Y | N | N | 2 | 10 | In this study, we assessed the residual setup error after 2D kV/MV orthogonal imaging in patients undergoing APBI. Our primary aim was to use the soft tissue information provided by CBCT imaging to assess the residual error in alignment of patients who had previously been aligned to bony landmarks with on-board planar kV/MV imaging. Our secondary aim was to assess the dosimetric consequences of these residual setup errors on the coverage of the CTV and PTV. |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 57 | Morrow NV, Stepaniak C, White J, Wilson JF, Li XA. Intra- and interfractional variations for prone breast irradiation: an indication for image-guided radiotherapy. International Journal of Radiation Oncology* Biology* Physics. 2007 Nov 1;69(3):910-7. | Y | N | N | N | N | 1 | 6 | Intra- and interfractional errors for breast cancer patients undergoing breast irradiation in the prone position were analyzed. In this article, we analyze the intrafractional respiratory motion and the interfractional set-up errors, and determine the required CTV-to-PTV margins. The data presented indicate that image guidance capable of visualizing treatment target is highly desirable for prone breast PBI. |
| 38 | 59 | Koseoglu FG, Tuncel N, Kizildag AU, Garipagaoglu M, Adli M, Andic C. Assessment of setup accuracy in patients receiving postmastectomy radiotherapy using electronic portal imaging. Radiation medicine. 2007 Feb;25(2):45-52. | Y | N | N | N | N | 1 | 10 | The aim of this study was to investigate the setup accuracy for patients undergoing postmastectomy radiotherapy using electronic portal imaging. |
| 39 | 61 | White EA, Cho J, Vallis KA, Sharpe MB, Lee G, Blackburn H, Nageeti T, McGibney C, Jaffray DA. Cone beam computed tomography guidance for setup of patients receiving accelerated partial breast irradiation. International Journal of Radiation Oncology* Biology* Physics. 2007 Jun 1;68(2):547-54. | N | N | Y | N | N | 1 | 20 | The aims of this study were to use CBCT imaging to (1) report the errors for a conventional skin-mark setup, (2) report the residual errors for a CBCT-guided setup, (3) measure the subjectivity, or interobserver error, associated with performing manual registrations of the CBCT data sets, and (4) determine the visibility of the post-lumpectomy seroma on the CBCT images. |
| 40 | 62 | Penninkhof J, Quint S, de Boer H, Mens JW, Heijmen B, Dirkx M. Surgical clips for position verification and correction of non-rigid breast tissue in simultaneously integrated boost (SIB) treatments. Radiotherapy and Oncology. 2009 Jan 1;90(1):110-5. | Y | Y | Y | N | N | 3 | 30 | The aim of this study is to investigate whether surgical clips in the lumpectomy cavity are representative for position verification of both the tumour bed and the whole breast in simultaneously integrated boost (SIB) treatments. |
| 41 | 65 | Truong MT, Hirsch AE, Kovalchuk N, Qureshi MM, Damato A, Schuller B, Vassilakis N, Stone M, Gierga D, Willins J, Kachnic LA. Cone-beam computed tomography image guided therapy to evaluate lumpectomy cavity variation before and during breast radiotherapy. Journal of Applied Clinical Medical Physics. 2013 Mar;14(2):209-19. | N | N | Y | N | N | 1 | 26 | The purpose of this study was to evaluate the rate of change (RoC) in the size of the lumpectomy cavity (LC) before and during breast radiotherapy (RT) using cone-beam computed tomography (CBCT), relative to the initial LC volume at CT simulation (CTVLC) and timing from surgery. |
| 42 | 67 | Jung JH, Cho KH, Moon SK, Bae SH, Min CK, Kim ES, Yeo SG, Choi JH, Jung JY, Choe BY, Suh | N | N | Y | N | N | 1 | 28 | The purpose of this study was to analyze the rotational errors of roll, pitch, and yaw in the whole breast cancer treated by the three-dimensional radiation therapy (3D-CRT) using TomoDirect (TD) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | TS. Rotation Errors of Breast Cancer on 3D-CRT in TomoDirect. Progress in Medical Physics. 2015 Mar 1;26(1):6-11. | | | | | | | | |
| 43 | 69 | Hasan Y, Kim L, Wloch J, Chi Y, Liang J, Martinez A, Yan D, Vicini F. Comparison of planned versus actual dose delivered for external beam accelerated partial breast irradiation using cone-beam CT and deformable registration. International Journal of Radiation Oncology* Biology* Physics. 2011 Aug 1;80(5):1473-6. | N | N | Y | N | N | 1 | 16 | The purpose of this study was to reconstruct dose delivery during EB APBI incorporating setup errors and deformation to detect potential target underdosage and overdosage of normal tissue, when using laser alignment to stable anatomical structures and a CTV to PTV expansion of 10 mm. |
| 44 | 70 | Jacob J, Heymann S, Borget I, Dumas I, Riahi E, Maroun P, Ezra P, Roberti E, Rivera S, Deutsch E, Bourgier C. Dosimetric effects of the interfraction variations during whole breast radiotherapy: a prospective study. Frontiers in Oncology. 2015 Sep 16;5:199. | Y | N | N | N | N | 1 | 10 | We prospectively studied the role of the interfraction variations on the target volume coverage and healthy tissue exposure during radiotherapy indicated for early-stage BC. |
| 45 | 73 | Sánchez-Rubio P, Rodríguez-Romero R, Castro-Tejero P. A retrospective tomotherapy image-guidance study: analysis of more than 9,000 MVCT scans for ten different tumor sites. Journal of Applied Clinical Medical Physics. 2014 Nov;15(6):30-45. | N | N | Y | N | N | 1 | 389 | The purpose of this study was to quantify the systematic and random errors for various disease sites when daily MVCT scans are acquired, and to analyze alternative offline verification protocols (OVP) with respect to the patient setup accuracy achieved. |
| 46 | 74 | Semaniak A, Kukołowicz P. Set-up uncertainty during postmastectomy radiotherapy with Segmented Photon Beams Technique. Reports of Practical Oncology & Radiotherapy. 2015 May 1;20(3):181-7. | N | Y | N | N | N | 1 | 130 | In this study, we evaluated the immobilization system designed in our hospital. We also compared two protocols of set-up correction: the modified-No Action Level (mNAL) and the Internal Protocol. |
| 47 | 77 | Petillion S, Verhoeven K, Weltens C, Van den Heuvel F. Accuracy of a new paired imaging technique for position correction in whole breast radiotherapy. Journal of applied clinical medical physics. 2015 Jan;16(1):22-31. | N | Y | N | N | N | 1 | 40 | The purpose of this study was therefore 1) to investigate whether a new tangential-angled single modality paired imaging technique issuperior to our clinically used orthogonal-angled mixed modality paired imaging technique for position correction in WBRT, and 2) to assess the accuracy of the new technique for position correction in WBRT-LN. |
| 48 | 81 | Mukundan H, Mukherjee D, Tyagi K, Taneja S, Ranjan S, Sahu S. Dosimetric and | Y | N | N | N | N | 1 | 60 | This study is planned to evaluate the dosimetric and isocentric variations and determine setup reproducibility and errors in a cohort of 60 (1 male and 59 females) breast cancer patients treated with mega voltage radiographs using an online electronic portal imaging (EPI) protocol. |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | isocentric variations due to patient setup errors in CT-based treatment planning for breast cancer by electronic portal imaging. medical journal armed forces india. 2020 Jan 1;76(1):51-7. | | | | | | | | |
| 49 | 82 | Jung JH, Jung JY, Bae SH, Moon SK, Cho KH. Setup deviations for whole-breast radiotherapy with TomoDirect: A comparison of weekly and biweekly image-guided protocols. Journal of the Korean Physical Society. 2016 Oct;69(7):1247-53. | N | N | Y | N | N | 1 | 46 | The purpose of this study was to provide a quantitative comparison of patient setup deviations for different MVCT protocols (weekly vs. biweekly) when using TomoDirect for WBRT in patients with breast cancer. |
| 50 | 84 | Ma Z, Zhang W, Su Y, Liu P, Pan Y, Zhang G, Song Y. Optical surface management system for patient positioning in interfractional breast cancer radiotherapy. BioMed Research International. 2018 Jan 9;2018. | N | N | Y | Y | N | 2 | 20 | The aim of this study is to analyze 200 patient setups in 20 patients with breast cancer by analyzing the reliability and accuracy of OSMS compared with cone-beam CT (CBCT). |
| 51 | 86 | Alderliesten T, Heemsbergen WD, Betgen A, Topolnjak R, Elkhuizen PH, van Vliet-Vroegindeweij C, Remeijer P. Breast-shape changes during radiation therapy after breast-conserving surgery. Physics and imaging in radiation oncology. 2018 Apr 1;6:71-6. | N | N | Y | N | N | 1 | 17 | The purpose of this study was to thoroughly investigate the breast-shape changes during the course of RT after breast-conserving surgery (BCS). For this purpose, breast contours extracted from cone-beam computed tomography (CBCT) scans acquired during the course of treatment were analyzed in 3D in terms of deviations (mean and standard deviation) relative to the contour of the breast on the planning CT scan. |
| 52 | 91 | Chang AJ, Zhao H, Wahab SH, Moore K, Taylor M, Zoberi I, Powell SN, Klein EE. Video surface image guidance for external beam partial breast irradiation. Practical Radiation Oncology. 2012 Apr 1;2(2):97-105. | N | Y | N | Y | N | 2 | 23 | The current study compared 3 alternative image-guided methods for setup accuracy in partial breast irradiation. The systems evaluated include the following: (1) video surface mapping of the breast; (2) kilovoltage planar imaging of the chest wall; and (3) laser-based setup. Surgical clip position was used as a surrogate for the lumpectomy cavity position. The dosimetric impact of setup error with video surface mapping and planar imaging of the chest wall was also investigated. |
| | | | COUNT Y=19 | COUNT Y=18 | COUNT Y=17 | COUNT Y=8 | COUNT Y=4 | COUNT 1=39 | Median=23 | |
| | | | | | | | | COUNT 2=12 | Min=6 | |
| | | | | | | | | COUNT 3=1 | Max=389 | |