

## Calypso® System Bibliography

### Beacon Care Package – Soft Tissue

Betancourt R, Zou W, Plastaras JP, Metz JM, Teo BK, Kassae A. Abdominal and pancreatic motion correlation using 4D CT, 4D transponders, and a gating belt. *J Appl Clin Med Phys.* 2013 May 6;14(3):4060. doi: 10.1120/jacmp.v14i3.4060. University of Pennsylvania, Philadelphia, PA

Shinohara ET, Kassae A, Mitra N, Vapiwala N, Plastaras JP, Drebin J, Wan F, Metz JM. Feasibility of electromagnetic transponder use to monitor inter- and intrafractional motion in locally advanced pancreatic cancer patients. *Int J Radiat Oncol Biol Phys.* 2012 Jun 1;83(2):566-73. doi: 10.1016/j.ijrobp.2011.07.025. Epub 2011 Nov 16. The Vanderbilt Clinic, Nashville, TN

### Beacon Care Package – Prostate / Prostatic Bed

Lovelock DM, Messineo AP, Cox BW, Kollmeier MA, Zelefsky MJ. Continuous Monitoring and Intrafraction Target Position Correction During Treatment Improves Target Coverage for Patients Undergoing SBRT Prostate Therapy. *Int J Radiat Oncol Biol Phys.* 2015 Mar 1;91(3):588-94. doi: 10.1016/j.ijrobp.2014.10.049. Epub 2015 Jan 30. PubMed PMID: 25680601. Memorial Sloan Kettering Cancer Center, New York, NY; North Shore-Long Island Jewish Health System, New Hyde Park, NY [Epub ahead of print]

Mantz C. A Phase II Trial of Stereotactic Ablative Body Radiotherapy for Low-Risk Prostate Cancer Using a Non-Robotic Linear Accelerator and Real-Time Target Tracking: Report of Toxicity, Quality of Life, and Disease Control Outcomes with 5-Year Minimum Follow-Up. *Front Oncol.* 2014;4:279. doi: 10.3389/fonc.2014.00279. 21st Century Oncology

Franz AM, Schmitt D, Seitel A, Chatrasingh M, Echner G, Oelfke U, Nill S, Birkfellner W, Maier-Hein L. Standardized accuracy assessment of the calypso wireless transponder tracking system. *Phys Med Biol.* 2014 Nov 21;59(22):6797-810. doi: 10.1088/0031-9155/59/22/6797. Epub 2014 Oct 21. German Cancer Research Center (DKFZ), Heidelberg, Germany

Mayyas E, Chetty IJ, Chetvertkov M, Wen N, Neicu T, Nurushev T, Ren L, Lu M, Stricker H, Pradhan D, Movsas B, Elshaikh MA. Evaluation of multiple image-based modalities for image-guided radiation therapy (IGRT) of prostate carcinoma: a prospective study. *Med Phys.* 2013 Apr;40(4):041707. doi: 10.1118/1.4794502. Henry Ford Health System, Detroit, Michigan

Hall WA, Fox TH, Jiang X, Prabhu RS, Rossi PJ, Godette K, Jani AB. Treatment efficiency of volumetric modulated arc therapy in comparison with intensity-modulated radiotherapy in the treatment of prostate cancer. *J Am Coll Radiol.* 2013 Feb;10(2):128-34. doi: 10.1016/j.jacr.2012.06.014. Epub 2012 Dec 12. Emory University, Atlanta, GA

Klayton T, Price R, Buyyounouski MK, Sobczak M, Greenberg R, Li J, Keller L, Sopka D, Kutikov A, Horwitz EM. Prostate bed motion during intensity-modulated radiotherapy treatment. *Int J Radiat Oncol Biol Phys.* 2012 Sep 1;84(1):130-6. doi: 10.1016/j.ijrobp.2011.11.041. Epub 2012 Feb 11. Fox Chase Cancer Center, Philadelphia, PA

Berglund RK, Zaytoun O, Thousand R, Stephans K, Tendulkar R, Klein EA, Jones JS. Early infectious complications with transponder placement for external beam radiation therapy for prostate cancer. *BJU Int.* 2012 Sep;110(6):834-9. doi: 10.1111/j.1464-410X.2011.10861.x. Epub 2012 Feb 16. Glickman Urologic and Kidney Institute, Cleveland, OH

Foster RD, Pistenmaa DA, Solberg TD. A comparison of radiographic techniques and electromagnetic transponders for localization of the prostate. *Radiat Oncol.* 2012 Jun 21;7:101. doi: 10.1186/1748-717X-7-101. UT Southwestern Medical Center, Dallas, TX

Poludniowski G, Webb S, Evans PM. Technical note: suppression of artifacts arising from simultaneous cone-beam imaging and RF transponder tracking in prostate radiotherapy. *Med Phys.* 2012 Mar;39(3):1646-9. doi: 10.1118/1.3689809. Royal Marsden NHS Foundation Trust, Surrey, UK

Su Z, Zhang L, Murphy M, Williamson J. Analysis of prostate patient setup and tracking data: potential intervention strategies. *Int J Radiat Oncol Biol Phys.* 2011 Nov 1;81(3):880-7. doi: 10.1016/j.ijrobp.2010.07.1978. Epub 2010 Oct 8. University of Florida, Jacksonville, FL

Canter D, Kutikov A, Horwitz EM, Greenberg RE. Transrectal implantation of electromagnetic transponders following radical prostatectomy for delivery of IMRT. *Can J Urol.* 2011 Aug;18(4):5844-8. Fox Chase Cancer Center, Philadelphia, PA

Rassiah-Szegedi P, Wang B, Szegedi M, Tward J, Zhao H, Huang YJ, Sarkar V, Shrieve D, Salter B. Individualized margins for prostate patients using a wireless localization and tracking system. *J Appl Clin Med Phys.* 2011 May 22;12(3):3516. University of Utah, Salt Lake City, UT

Tanyi JA, He T, Summers PA, Mburu RG, Kato CM, Rhodes SM, Hung AY, Fuss M. Assessment of planning target volume margins for intensity-modulated radiotherapy of the prostate gland: role of daily inter- and intrafraction motion. *Int J Radiat Oncol Biol Phys.* 2010 Dec 1;78(5):1579-85. doi: 10.1016/j.ijrobp.2010.02.001. Epub 2010 May 14. Oregon Health & Science University, Portland, OR

Canter D, Greenberg RE, Horwitz EM, Kutikov A, Li J, Long C, Buyyounouski M, Boorjian SA. Implantation of electromagnetic transponders following radical prostatectomy for delivery of IMRT. *Can J Urol.* 2010 Oct;17(5):5365-9. Fox Chase Cancer Center, Philadelphia, PA

Bittner N, Butler WM, Reed JL, Murray BC, Kurko BS, Wallner KE, Merrick GS. Electromagnetic tracking of intrafraction prostate displacement in patients externally immobilized in the prone position. *Int J Radiat Oncol Biol Phys.* 2010 Jun 1;77(2):490-5. doi: 10.1016/j.ijrobp.2009.05.033. Epub 2009 Sep 21. Tacoma/Valley Radiation Oncology Centers, Tacoma, WA

Sandler HM, Liu PY, Dunn RL, Khan DC, Tropper SE, Sanda MG, Mantz CA. Reduction in patient-reported acute morbidity in prostate cancer patients treated with 81-Gy Intensity-modulated radiotherapy using reduced planning target volume margins and electromagnetic tracking: assessing the impact of margin reduction study. *Urology.* 2010 May;75(5):1004-8. doi: 10.1016/j.urology.2009.10.072. Epub 2010 Feb 13. Cedars-Sinai Medical Center, Los Angeles, CA

Rajendran RR, Plastaras JP, Mick R, McMichael Kohler D, Kassae A, Vapiwala N. Daily isocenter correction with electromagnetic-based localization improves target coverage and rectal sparing during prostate radiotherapy. *Int J Radiat Oncol Biol Phys.* 2010 Mar 15;76(4):1092-9. doi: 10.1016/j.ijrobp.2009.03.036. Epub 2009 Jul 20. University of Pennsylvania, Philadelphia, PA

Foster RD, Solberg TD, Li HS, Kerkhoff A, Enke CA, Willoughby TR, Kupelian PA. Comparison of transabdominal ultrasound and electromagnetic transponders for prostate localization. *J Appl Clin Med Phys.* 2010 Jan 6;11(1):2924. UT Southwestern Medical Center, Dallas, TX

Kimple RJ, Wallen EM, Pruthi R, Marks LB. A simple algorithm to assess patient suitability for Calypso-seed implantation for four-dimensional prostate localization. *J Appl Clin Med Phys.* 2009 Dec 3;11(1):3107. University of North Carolina at Chapel Hill, Chapel Hill, NC

Quigley MM, Mate TP, Sylvester JE. Prostate tumor alignment and continuous, real-time adaptive radiation therapy using electromagnetic fiducials: clinical and cost-utility analyses. *Urol Oncol.* 2009 Sep-Oct;27(5):473-82. doi: 10.1016/j.urolonc.2008.04.017. Epub 2008 Jul 14. Calypso Medical Technologies, Seattle, WA

Zhu X, Bourland JD, Yuan Y, Zhuang T, O'Daniel J, Thongphiew D, Wu QJ, Das SK, Yoo S, Yin FF. Tradeoffs of integrating real-time tracking into IGRT for prostate cancer treatment. *Phys Med Biol.* 2009 Sep 7;54(17):N393-401. doi: 10.1088/0031-9155/54/17/N03. Epub 2009 Aug 6. Duke University, Durham, NC

Ogunleye T, Rossi PJ, Jani AB, Fox T, Elder E. Performance evaluation of Calypso 4D localization and kilovoltage image guidance systems for interfraction motion management of prostate patients. *ScientificWorldJournal.* 2009 Jun 12;9:449-58. doi: 10.1100/tsw.2009.61. Emory University, Atlanta, GA

Shinohara K, Roach M 3rd. Technique for implantation of fiducial markers in the prostate. *Urology.* 2008 Feb;71(2):196-200. doi: 10.1016/j.urology.2007.10.011. University of California San Francisco and UCSF/Mt. Zion Comprehensive Cancer Center, San Francisco, CA

Litzenberg DW, Willoughby TR, Balter JM, Sandler HM, Wei J, Kupelian PA, Cunningham AA, Bock A, Aubin M, Roach M 3rd, Shinohara K, Pouliot J. Positional stability of electromagnetic transponders used for prostate localization and continuous, real-time tracking. *Int J Radiat Oncol Biol Phys.* 2007 Jul 15;68(4):1199-206. Epub 2007 May 21. University of Michigan, Ann Arbor, MI

Kupelian P, Willoughby T, Mahadevan A, Djemil T, Weinstein G, Jani S, Enke C, Solberg T, Flores N, Liu D, Beyer D, Levine L. Multi-institutional clinical experience with the Calypso System in localization and continuous, real-time monitoring of the prostate gland during external radiotherapy. *Int J Radiat Oncol Biol Phys.* 2007 Mar 15;67(4):1088-98. Epub 2006 Dec 21. M.D. Anderson Cancer Center Orlando, Orlando, FL

Willoughby TR, Kupelian PA, Pouliot J, Shinohara K, Aubin M, Roach M 3rd, Skrumeda LL, Balter JM, Litzenberg DW, Hadley SW, Wei JT, Sandler HM. Target localization and real-time tracking using the Calypso 4D localization system in patients with localized prostate cancer. *Int J Radiat Oncol Biol Phys.* 2006 Jun 1;65(2):528-34. M.D. Anderson Cancer Center Orlando, Orlando, FL

Cramer AK, Haile AG, Ognjenovic S, Doshi TS, Reilly WM, Rubinstein KE, Nabavizadeh N, Nguyen T, Meng LZ, Fuss M, Tanyi JA, Hung AY. Real-time prostate motion assessment: image-guidance and the temporal dependence of intra-fraction motion. *BMC Med Phys.* 2013 Sep 23;13(1):4. doi: 10.1186/1756-6649-13-4. Oregon Health & Science University, Portland, OR

Wu QJ, Li T, Yuan L, Yin FF, Lee WR. Single institution's dosimetry and IGRT analysis of prostate SBRT. *Radiat Oncol.* 2013 Sep 13;8:215. doi: 10.1186/1748-717X-8-215. Duke University, Durham, NC

## Calypso System General Use

Wisotzky E, Fast MF, Oelfke U, Nill S. Automated marker tracking using noisy X-ray images degraded by the treatment beam. *Z Med Phys.* 2014 Sep 30. doi:pil: S0939-3889(14)00101-9. 10.1016/j.zemedi.2014.08.006. Fraunhofer Institute for Production Systems and Design Technology (IPK), Berlin, Germany; German Cancer Research Center (DKFZ), Heidelberg, Germany; The Institute of Cancer Research and The Royal Marsden NHS Foundation Trust, London, UK [Epub ahead of print]

Zou W, Betancourt R, Yin L, Metz J, Avery S, Kassae A. Effects on the photon beam from an electromagnetic array used for patient localization and tumor tracking. *J Appl Clin Med Phys.* 2013 May 6;14(3):4138. doi: 10.1120/jacmp.v14i3.4138. Cancer Institute of New Jersey, New Brunswick, NJ

Santanam L, Noel C, Willoughby TR, Esthappan J, Mutic S, Klein EE, Low DA, Parikh PJ. Quality assurance for clinical implementation of an electromagnetic tracking system. *Med Phys.* 2009 Aug;36(8):3477-86. Washington University School of Medicine, St. Louis, MO

Rau AW, Nill S, Eidens RS, Oelfke U. Synchronized tumour tracking with electromagnetic transponders and kV x-ray imaging: evaluation based on a thorax phantom. *Phys Med Biol.* 2008 Jul 21;53(14):3789-805. doi: 10.1088/0031-9155/53/14/006. Epub 2008 Jun 23. German Cancer Research Center (DKFZ), Heidelberg, Germany

Santanam L, Malinowski K, Hubensmidt J, Dimmer S, Mayse ML, Bradley J, Chaudhari A, Lechleiter K, Goddu SK, Esthappan J, Mutic S, Low DA, Parikh P. Fiducial-based translational localization accuracy of electromagnetic tracking system and on-board kilovoltage imaging system. *Int J Radiat Oncol Biol Phys.* 2008 Mar 1;70(3):892-9. doi: 10.1016/j.ijrobp.2007.10.005. Washington University School of Medicine, St. Louis, MO

## Details of the Literature Search

The above bibliography is based upon a literature search conducted in PubMed March 23, 2015 using the following search terms:

```
(calypso[Title/Abstract] OR (electromagnetic[Title/Abstract] AND (track[Title/Abstract] OR tracks[Title/Abstract] OR (tracking[Title/Abstract] NOT "edge tracking"[Title/Abstract]))) OR transponder*[Title/Abstract])
AND ("neoplasms"[MeSH Terms] OR "cancer"[title/abstract] OR "tumor"[title/abstract] OR "tumour"[title/abstract])
AND ("2004/12/1"[PDAT] : "2015/03/23"[PDAT])
NOT "editorial"[Publication Type]
NOT ("guided navigation"[Title/Abstract] OR "navigated bronchoscopy"[Title/Abstract] OR "electromagnetic navigation"[Title/Abstract] OR ("bronchoscope"[Title/Abstract] AND "EMT"[title/abstract]) OR "needle tracking"[Title/Abstract] OR "3D US"[Title/Abstract] OR "ovarian cancer"[Title/Abstract] OR "brachytherapy"[Mesh] OR "mitochondrial"[Title/Abstract] OR "FhSPECT-US"[Title/Abstract])
```

Of the papers returned by the search, publications were excluded from the bibliography for the following reasons: 1) No use of the Calypso system; 2) No analysis related to safety, performance, or clinical use of the Calypso system; 3) Review article; or 4) Off-label use of a Varian Medical Systems product.