

HD120™ MLC High Definition Multileaf Collimator Bibliography*

- Younge KC, Kuchta JR, Mikell JK, Rosen B, Bredfeldt JS, Matuszak MM. The impact of a high-definition multileaf collimator for spine SBRT. *J Appl Clin Med Phys.* 2017 Nov;18(6):97-103. University of Michigan Health System, Ann Arbor, MI
- French SB, Bhagroo S, Nazareth DP, Podgorsak MB. Adapting VMAT plans optimized for an HD120 MLC for delivery with a Millennium MLC. *J Appl Clin Med Phys.* 2017 Sep;18(5):143-151, Roswell Park Cancer Institute, Buffalo, NY
- Gallagher KJ, Wong J, Zhang J. Photon caliper to achieve submillimeter positioning accuracy. *Phys Med Biol.* 2017 Sep 1;62(18):N404-N416 Oregon Health & Science University, Portland, OR
- Peng V, Suchowerska N, Rogers L, Claridge Mackonis E, Oakes S, McKenzie DR. Grid therapy using high definition multileaf collimators: realizing benefits of the bystander effect. *Acta Oncol.* 2017 Aug;56(8):1048-1059, University of Sydney, Camperdown, NSW, Australia
- Kerolus MG, Sen N, Mayekar S, Templeton A, Turian J, Diaz A, Munoz L, Byrne RW, Sani S. TrueBeam® Radiosurgery for the Treatment of Trigeminal Neuralgia: Preliminary Results at a Single Institution. *Cureus.* 2017 Jun 16;9(6):e1362, Rush University Medical Center, Chicago, IL
- Li J, Shi W, Andrews D, Werner-Wasik M, Lu B, Yu Y, Dicker A, Liu H. Comparison of Online 6 Degrees-of-Freedom Image Registration of Varian TrueBeam® Cone-Beam CT and BrainLab ExacTrac X-Ray for Intracranial Radiosurgery. *Technol Cancer Res Treat.* 2017 Jun;16(3):339-343. Thomas Jefferson University, Philadelphia, PA
- Xu H, Brown S, Chetty IJ, Wen N. A Systematic Analysis of Errors in Target Localization and Treatment Delivery for Stereotactic Radiosurgery Using 2D/3D Image Registration. *Technol Cancer Res Treat.* 2017 Jun;16(3):321-331. Wayne State University, Detroit, MI
- Gardner SJ, Lu S, Liu C, Wen N, Chetty IJ. Tuning of Acuros® XB source size setting for small intracranial targets. *J Appl Clin Med Phys.* 2017 May;18(3):170-181. Henry Ford Health System, Detroit, MI
- Oliver JA, Kelly P, Meeks SL, Willoughby TR, Shah AP. Orthogonal image pairs coupled with OSMS for noncoplanar beam angle, intracranial, single-isocenter, SRS treatments with multiple targets on the Varian Edge™ radiosurgery system. *Adv Radiat Oncol.* 2017 Apr 26;2(3):494-502. UF Health Cancer Center - Orlando Health, Orlando, FL
- Chae SM, Lee KW, Son SH. Dosimetric impact of multileaf collimator leaf width according to sophisticated grade of technique in the IMRT and VMAT planning for pituitary adenoma lesion. *Oncotarget.* 2016 Nov 22;7(47):78119-78126. St. Mary's Hospital, Seoul, South Korea
- Chung JB, Kang SW, Eom KY, Song C, Choi KS, Suh TS. Comparison of Dosimetric Performance among Commercial Quality Assurance Systems for Verifying Pretreatment Plans of Stereotactic Body Radiotherapy Using Flattening-Filter-Free Beams. *J Korean Med Sci.* 2016 Nov;31(11):1742-1748. Seoul National University Bundang Hospital, Seongnam, South Korea
- Mancosu P, Fogliata A, Stravato A, Tomatis S, Cozzi L, Scorsetti M. Accuracy evaluation of the optical surface monitoring system on Edge® linear accelerator in a phantom study. *Med Dosim.* 2016 Summer;41(2):173-9. Humanitas Clinical and Research Center, Milan-Rozzano, Italy
- Park JM, Park SY, Kim JH, Carlson J, Kim JI. The effect of extremely narrow MLC leaf width on the plan quality of VMAT for prostate cancer. *Radiat Oncol.* 2016 Jun 23;11:85 Seoul National University Hospital, Seoul, South Korea
- Yang J, Tang G, Zhang P, Hunt M, Lim SB, LoSasso T, Mageras G. Dose calculation for hypofractionated volumetric-modulated arc therapy: approximating continuous arc delivery and tongue-and-groove modeling. *J Appl Clin Med Phys.* 2016 Mar 8;17(2):4989, Memorial Sloan Kettering Cancer Center, New York, NY
- Pokhrel D, McClinton C, Sood S, Badkul R, Saleh H, Jiang H, Lominska C. Monte Carlo evaluation of tissue heterogeneities corrections in the treatment of head and neck cancer patients using stereotactic radiotherapy. *J Appl Clin Med Phys.* 2016 Mar 8;17(2):6055, University of Kansas, Kansas City, KS

* This bibliography is a comprehensive selection of articles but is not necessarily an exhaustive list of literature pertaining to SRS and SBRT

Tanny S, Sperling N, Parsai EI. [Correction factor measurements for multiple detectors used in small field dosimetry on the Varian Edge® radiosurgery system.](#) *Med Phys.* 2015 Sep;42(9):5370-6. University of Toledo Medical Center, Toledo, OH

Wen N, Li H, Song K, Chin-Snyder K, Qin Y, Kim J, Bellon M, Gulam M, Gardner S, Doemer A, Devpura S, Gordon J, Chetty I, Siddiqui F, Ajlouni M, Pompa R, Hammoud Z, Simoff M, Kalkanis S, Movsas B, Siddiqui MS. [Characteristics of a novel treatment system for linear accelerator-based stereotactic radiosurgery.](#) *J Appl Clin Med Phys.* 2015 Jul 8;16(4):5313. Henry Ford Health System, Detroit, MI

Subramanian SV, Subramani V, Thirumalai Swamy S, Gandhi A, Chilukuri S, Kathirvel M. [Is 5 mm MMLC suitable for VMAT-based lung SBRT? A dosimetric comparison with 2.5 mm HDMLC using RTOG-0813 treatment planning criteria for both conventional and high-dose flattening filter-free photon beams.](#) *J Appl Clin Med Phys.* 2015 Jul 8;16(4):5415. Bharathiar University, Coimbatore, India

Serna A, Puchades V, Mata F, Ramos D, Alcaraz M. [Influence of multi-leaf collimator leaf width in radiosurgery via volumetric modulated arc therapy and 3D dynamic conformal arc therapy.](#) *Phys Med.* 2015 May;31(3):293-6, Santa Lucia University Hospital, Murcia, Spain

Kothavade V, Jamema SV, Gupta T, Pungavkar S, Upasani M, Juvekar S, Jalali R. [Which is the most optimal technique to spare hippocampus? - Dosimetric comparisons of SCRT, IMRT, and tomotherapy.](#) *J Cancer Res Ther.* 2015 Apr-Jun;11(2):358-63. Global Hospital, Mumbai, India

Hernandez V, Abella R, Calvo JF, Jurado-Bruggemann D, Sancho I, Carrasco P. [Determination of the optimal tolerance for MLC positioning in sliding window and VMAT techniques.](#) *Med Phys.* 2015 Apr;42(4):1911-6. Hospital Sant Joan de Reus, Tarragona, Spain

Kim JI, Park SY, Kim HJ, Kim JH, Ye SJ, Park JM. [The sensitivity of gamma-index method to the positioning errors of high-definition MLC in patient-specific VMAT QA for SBRT.](#) *Radiat Oncol.* 2014 Jul 28;9:167. Seoul National University Hospital, Seoul, South Korea

Bergman AM, Gete E, Duzenli C, Teke T. [Monte Carlo modeling of HD120™ multileaf collimator on Varian TrueBeam® linear accelerator for verification of 6X and 6X FFF VMAT SABR treatment plans.](#) *J Appl Clin Med Phys.* 2014 May 8;15(3):4686. BC Cancer Agency - Vancouver Centre, Vancouver, BC, Canada

Chae SM, Lee GW, Son SH. [The effect of multileaf collimator leaf width on the radiosurgery planning for spine lesion treatment in terms of the modulated techniques and target complexity.](#) *Radiat Oncol.* 2014 Mar 8;9(1):72. St. Mary's Hospital, Catholic University of Korea, Incheon, South Korea

Hong CS, Ju SG, Kim M, Kim JI, Kim JM, Suh TS, Han Y, Ahn YC, Choi DH, Nam H, Park HC. [Dosimetric effects of multileaf collimator leaf width on intensity-modulated radiotherapy for head and neck cancer.](#) *Med Phys.* 2014 Feb;41(2):021712. Samsung Medical Center, Seoul, South Korea

Pommer T, Falk M, Poulsen PR, Keall PJ, O'Brien RT, Munck af Rosenschöld P. [The impact of leaf width and plan complexity on DMLC tracking of prostate intensity modulated arc therapy.](#) *Med Phys.* 2013 Nov;40(11):111717. Rigshospitalet, Copenhagen, Denmark

Shang Q, Qi P, Ferjani S, Xia P. [Effect of MLC leaf width on treatment adaptation and accuracy for concurrent irradiation of prostate and pelvic lymph nodes.](#) *Med Phys.* 2013 Jun;40(6):061701. Cleveland Clinic, Cleveland, OH

Tanyi JA, Doss EJ, Kato CM, Monaco DL, Zmeng L, Chen Y, Kubicky CD, Marquez CM, Fuss M. [Dynamic conformal arc cranial stereotactic radiosurgery: implications of multileaf collimator margin on dose-volume metrics.](#) *Br J Radiol.* 2012 Nov;85(1019):e1058-66. Oregon Health and Science University, Portland, OR

Kielar KN, Mok E, Hsu A, Wang L, Luxton G. [Verification of dosimetric accuracy on the TrueBeam® STx: rounded leaf effect of the high definition MLC.](#) *Med Phys.* 2012 Oct;39(10):6360-71. Stanford University Medical Center, Palo Alto, CA

Vazquez-Quino LA, Massingill B, Shi C, Gutierrez A, Esquivel C, Eng T, Papanikolaou N, Stathakis S. [Monte Carlo modeling of a Novalis Tx™ Varian 6 MV with HD120™ multileaf collimator.](#) *J Appl Clin Med Phys.* 2012 Sep 6;13(5):3960. University of Texas Health Science Center at San Antonio, San Antonio, TX

Kim J, Wen N, Jin JY, Walls N, Kim S, Li H, Ren L, Huang Y, Doemer A, Faber K, Kunkel T, Balawi A, Garbarino K, Levin K, Patel S, Ajlouni M, Miller B, Nurushev T, Huntzinger C, Schulz R, Chetty IJ, Movsas B, Ryu S. [Clinical commissioning and use of the Novalis Tx™ linear accelerator for SRS and SBRT.](#) *J Appl Clin Med Phys.* 2012 May 10;13(3):3729. Henry Ford Health System, Detroit, MI

Wang L, Kielar KN, Mok E, Hsu A, Dieterich S, Xing L. [An end-to-end examination of geometric accuracy of IGRT using a new digital accelerator equipped with onboard imaging system.](#) *Phys Med Biol.* 2012 Feb 7;57(3):757-69. Stanford University Medical Center, Palo Alto, CA

Borges C, Zarza-Moreno M, Heath E, Teixeira N, Vaz P. Monte Carlo modeling and simulations of the High Definition (HD120™) micro MLC and validation against measurements for a 6 MV beam. *Med Phys.* 2012 Jan;39(1):415. MedicalConsult SA, Lisboa, Portugal

Fujimoto S, Ono K, Furukawa K, Kudo T, Akagi Y, Koyama T, Hirokawa Y, Kawai S, Nakashima T. [Influence of high-definition multileaf collimator for three-dimensional conformal radiotherapy and intensity-modulated radiotherapy of prostate cancer]. *Nihon Hoshasen Gijutsu Gakkai Zasshi.* 2012;68(7):825-34. Hiroshima Heiwa Clinic, Hiroshima, Japan

Ohtakara K, Hayashi S, Tanaka H, Hoshi H. Dosimetric comparison of 2.5 mm vs. 3.0 mm leaf width micro-multileaf collimator-based treatment systems for intracranial stereotactic radiosurgery using dynamic conformal arcs: implications for treatment planning. *Jpn J Radiol.* 2011 Nov;29(9):630-38. Gifu University Graduate School of Medicine, Gifu, Japan

Fix MK, Volken W, Frei D, Frauchiger D, Born EJ, Manser P. Monte Carlo implementation, validation, and characterization of a 120 leaf MLC. *Med Phys.* 2011 Oct;38(10):5311-20 Inselspital and University of Bern, Bern, Switzerland

Tanyi JA, Kato CM, Chen Y, Chen Z, Fuss M. Impact of the high-definition multileaf collimator on linear accelerator-based intracranial stereotactic radiosurgery. *Br J Radiol.* 2011 Jul;84(1003):629-38. Oregon Health and Science University, Portland, OR

Sharma DS, Dongre PM, Mhatre V, Heigrujam M. Physical and dosimetric characteristic of high-definition multileaf collimator (HDMLC) for SRS and IMRT. *J Appl Clin Med Phys.* 2011 Apr 14;12(3):3475. Kokilaben Dhirubhai Ambani Hospital, Mumbai, India

Dhabaan A, Elder E, Schreibmann E, Crocker I, Curran WJ, Oyesiku NM, Shu HK, Fox T. Dosimetric performance of the new high-definition multileaf collimator for intracranial stereotactic radiosurgery. *J Appl Clin Med Phys.* 2010 Jun 21;11(3):3040 Emory University, Atlanta, GA

Clift C, Thomas A, Adamovics J, Chang Z, Das I, Oldham M. Toward acquiring comprehensive radiosurgery field commissioning data using the PRESAGE/optical-CT 3D dosimetry system. *Phys Med Biol.* 2010 Mar 7;55(5):1279-93 Duke University Medical Center, Durham, NC

Tanyi JA, Summers PA, McCracken CL, Chen Y, Ku LC, Fuss M. Implications of a high-definition multileaf collimator (HD-MLC) on treatment planning techniques for stereotactic body radiation therapy (SBRT): a planning study. *Radiat Oncol.* 2009 Jul 10;4:22. Oregon Health & Science University, Portland, OR

Wu QJ, Wang Z, Kirkpatrick JP, Chang Z, Meyer JJ, Lu M, Huntzinger C, Yin FF. Impact of collimator leaf width and treatment technique on stereotactic radiosurgery and radiotherapy plans for intra- and extracranial lesions. *Radiat Oncol.* 2009 Jan 21;4(1):3. Duke University, Durham, NC

Wuu CS, Kessel J, Xu Y. 3-D dosimetric evaluation of 2.5 mm HD120™ multileaf system for intensity modulated stereotactic radiosurgery using optical CT based gel dosimetry. *J Phys.: Conf Ser.* 2009 164(1):2-6. Columbia University, New York, NY

Fogliata A, Clivio A, Nicolini G, Vanetti E, Cozzi L. Intensity modulation with photons for benign intracranial tumours: a planning comparison of volumetric single arc, helical arc and fixed gantry techniques. *Radiother Oncol.* 2008 Dec;89(3):254-62. Oncology Institute of Southern Switzerland, Bellinzona, Switzerland

Chang Z, Wang Z, Wu QJ, Yan H, Bowsher J, Zhang J, Yin FF. Dosimetric characteristics of Novalis Tx™ system with high definition multileaf collimator. *Med Phys.* 2008 Oct;35(10):4460-3, Duke University Medical Center, Durham, NC

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[Intended Use Summary](#)

Varian Medical Systems' linear accelerators are intended to provide stereotactic radiosurgery and precision radiotherapy for lesions, tumors, and conditions anywhere in the body where radiation treatment is indicated.

[Safety Statement](#)

Radiation treatments may cause side effects that can vary depending on the part of the body being treated. The most frequent ones are typically temporary and may include, but are not limited to, irritation to the respiratory, digestive, urinary or reproductive systems, fatigue, nausea, skin irritation, and hair loss. In some patients, they can be severe. Treatment sessions may vary in complexity and time. Radiation treatment is not appropriate for all cancers.

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