

VRIJE UNIVERSITEIT

**Volumetric modulated arc therapy for stereotactic body radiotherapy:
Planning considerations, delivery accuracy and efficiency**

ACADEMISCH PROEFSCHRIFT

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de Vrije Universiteit Amsterdam,
op gezag van de rector magnificus
prof.dr. L.M. Bouter,
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van de Faculteit der Geneeskunde
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De Boelelaan 1105

door

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geboren te Maleisië

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copromotor: dr. W.F.A.R. Verbakel

comparison of volumetric modulated arc therapy with 3 other delivery techniques. *Radiation Oncology* 2010;97:437-42. 1. Volumetric-modulated arc therapy for stereotactic body radiotherapy of lung tumors: A comparison with intensity-modulated radiotherapy techniques. *Int J Radiat Oncol Biol Phys* 2011;81:1560-7. [10] Jiang X, Li T, Liu Y, Zhou L, Xu Y, Zhou X, et al. Planning analysis for locally advanced lung cancer: Dosimetric and efficiency comparisons between intensity-modulated radiotherapy (IMRT), single-arc/partial-arc volumetric modulated arc therapy (SA/PA-VMAT). *Radiat Oncol* 2011;6:140. [11] Merrow CE, Wang IZ, Podgorsak MB. A dosimetric evaluation of VMAT for the treatment of non-small cell lung cancer Evaluation of volumetric modulated arc therapy for cranial radiosurgery using multiple noncoplanar arcs. *Med Phys*. 2011;38:5863-75. Article PubMed Google Scholar. 9. Hong LX, Gard M, Lasala P, Kim M, Mah D, Chen CC, et al. Experience of micromultileaf collimator linear accelerator based single fraction stereotactic radiosurgery: Tumors dose inhomogeneity, conformity, and dose fall off. Chen F, Rao M, Ye JS, Shepard DM, Cao D. Impact of leaf motion constraints on IMAT plan quality, deliver accuracy, and efficiency. *Med Phys*. 2011;38:6106-18. Article PubMed Google Scholar. Download references. Acknowledgements. Not applicable. PhD Thesis title: "Volumetric modulated arc therapy for stereotactic body radiotherapy: planning considerations, delivery accuracy and efficiency". Author: Chin Loon, Ong Email: c.ong@vumc.nl Institution: VU university medical center, Amsterdam, The Netherlands Supervisors: Prof. Dr. Suresh Senan; Prof. Dr. Ben J. Slotman; Dr. Wilko F.A.R Verbakel Graduation Date: 19 September 2012 Available on line: <http://dare.uvu.vu.nl/handle/1871/38337> ISBN: 9789088914447 ABSTRACT: Intensity modulated radiotherapy (IMRT) is now a standard technique for radiation dose delivery for most tumors. 1. Fast arc delivery for stereotactic body radiotherapy of vertebral and lung tumors. *Int J Radiat Oncol Biol Phys* 2012;83(1):e137-143. 2. Chin Loon Ong geboren te Maleisië. 3. Volumetric modulated arc therapy for stereotactic body radiotherapy: Planning considerations, delivery accuracy and efficiency. Promotoren: copromotor: prof.dr. S. Senan prof.dr. B.J. Slotman dr. W.F.A.R. Verbakel. 4. Stereotactic body radiation therapy (SBRT) is a novel cancer treatment strategy where ultra-high doses per fraction are used, generally in the range of 8-20 Gy per fraction in a hypofractionated... Monte Carlo Intensity Modulate Radiation Therapy Stereotactic Body Radiation Therapy Internal Target Volume Mean Lung Dose. Recently, volumetric modulated arc therapy (VMAT) was introduced as a new treatment modality. VMAT techniques shorten delivery time, reducing the possibility of intrafraction target motion. However dose distributions can be quite different from standard 3D therapy. This study quantifies those differences, with focus on VMAT plans using unflattened photon beams. A total of 15 lung cancer patients previously treated with 3D or VMAT SBRT were randomly selected. For each patient, non-coplanar 3D, coplanar and non-coplanar VMAT and flattening filter free VMAT (FFF-VMAT) plans were generated to meet