VRIJE UNIVERSITEIT

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

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad Doctor aan
de Vrije Universiteit Amsterdam,
op gezag van de rector magnificus
prof.dr. L.M. Bouter,
in het openbaar te verdedigen
ten overstaan van de promotiecommissie
van de Faculteit der Geneeskunde
op woensdag 19 september 2012 om 11.45 uur
in de aula van de universiteit,
De Boelelaan 1105

door

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geboren te Maleisië
Volumetric modulated arc therapy (VMAT) is a novel radiation technique, which can achieve highly conformal dose distributions with improved target volume coverage and sparing of normal tissues compared with conventional radiotherapy techniques. VMAT also has the potential to offer additional advantages, such as reduced treatment delivery time compared with conventional static field intensity modulated radiotherapy (IMRT). The clinical worldwide use of VMAT is increasing significantly. Currently the majority of published data on VMAT are limited to planning and feasibility studies, although the Stereotactic body radiotherapy (SBRT) delivers a highly conformal and hypofractionated radiation dose to a small target with minimal radiation applied to the surrounding areas. The spine is an ideal site for SBRT owing to its relative immobility, the potential clinical benefits of high-dose delivery to this area, and the presence of adjacent critical structures such as the spinal cord, esophagus, and bowel. However, with the potential for radiation myelopathy if the dose is delivered inaccurately or if the spinal cord dose limit is set too high, proper treatment planning techniques for SBRT are...