Public Abstract
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Title: VOLUMETRIC MODULATED ARC THERAPY (VMAT): ADVANCED DELIVERY TECHNIQUES FOR STATIC AND MOVING TARGETS

Volumetric Modulated Arc Therapy (VMAT) is a rotational radiation therapy used to treat various cancer sites. The continuous delivery of a specific treatment plan for arc therapy can be achieved with multiple solutions for speed of gantry rotation, beam dose rate variation in time and with MLC leaf speed. This non-uniqueness of arc therapy creates a situation that, given treatment plan can be delivered with arc with variable degrees of efficiency. In this work, we evaluated advanced delivery techniques to improve delivery time and patient safety. VMAT has gained a lot of interest in the present days because of less treatment time and more conformal dose distribution with single and multiple arcs as compared to intensity modulated radiation therapy (IMRT). In this work we mainly focus on the fundamentals of intensity modulated arc therapy and importantly the single arc version of it. The interdependence between several delivery parameters (gantry angular speed, beam dose rate and MLC leaf velocity) for both static and the moving targets has been studied. We described the challenges involved in the VMAT delivery for moving targets, motion model and relation between the delivery parameters. We combined multiple arcs into a single arc to improve delivery efficiency. We studied the effect of fourth delivery parameter which is gantry acceleration and included it as a constraint during the delivery. The advanced quality assurance technique for VMAT delivery has been explored. The results have suggested that implementing these advanced delivery techniques has improved the treatment time further.