

AbstractID: 1069 Title: An on-line technique for CT-guided adaptive radiation therapy of soft tissue targets

The use of IMRT and improved daily target localization may allow a significant reduction in treatment margins. This reduction may, however, be limited by interfraction shape change of the target organ. An online CT-guided adaptive radiation therapy (ART) technique is described which significantly reduces the effect of shape change on dose delivered to the target organ and organs-at-risk. For a coplanar IMRT beam arrangement, each MLC leaf pair projects onto a specific slice of anatomy. If coplanar shape change of the target is neglected, then the shape change can be characterized as a local positional change by registering each slice in the daily CT images with the corresponding slice in the planning CT images. The translational shift of a specific CT slice can then be projected to a shift of the respective MLC for each gantry angle. This technique was tested for prostate cancer radiotherapy. The ART method gave improved coverage of the target, compared with a couch-shift method (which neglects shape change), particularly for the superior part of the prostate and for all the seminal vesicles. It also significantly reduced the rectal dose. Because the technique uses intensity-based image registration with no need for manual contouring, it may be an effective and clinically practical solution to the problem of interfraction shape changes. This technique may be applied to other soft tissue targets, including liver, bladder and breast cancers