

AbstractID: 7342 Title: Individualized gating windows based on four-dimensional CT information for respiration gated radiotherapy

Purpose: To relate gating window and displacement of a moving tumor target and develop a systematic method to individualize the gating window for respiration-gated radiation therapy (RT).

Methods and Materials: As the relationship between patient anatomy and respiration phase is contained in 4D images, we aim to quantify this information and utilize the data to guide gated treatment planning. After 4D image acquisition, the target and organs at risk were delineated manually on the selected gating phase. The contours were propagated automatically onto every phase-specific image set using a control volume based contour mapping technique. The mean and maximum distance between the contours in the gating phase and each of other phases was evaluated in three dimensions. The gating window was determined in such a way that the residual movement of the target within the window is equal or comparable to the patient's setup error. The proposed method was applied to plan the gated treatments of two lung cancer patients.

Results: A method to calculate patient-specific gating window has been developed. The general reference drawn from this study is that, with the aide of 4D images and automated 4D contour propagation, it is feasible to individualize the gating window selection. As compared with the current practice, the proposed technique eliminates the guesswork involved in choosing a gating window and avoids any potential error in planning gated RT.

Conclusions: Individualization of gating windows reduces the subjectivity in respiration-gated RT and has the potential to improve the treatment of moving targets.