

AbstractID: 6754 Title: Assessment of setup and internal margin in the treatment of rectum cancer patients on helical tomotherapy

Purpose : To provide an independent estimate of the intrafraction movement based on bony anatomy and internal organs with patients treated for rectal carcinoma on a helical tomotherapy unit, and to assess possible margin adaptations.

Introduction: Using helical tomotherapy conformal dose distributions can be created with strong gradients in all directions. A CT-detector has been integrated into the system allowing daily MVCT-positioning. However, in clinical protocols margins originating from traditional set-up procedures are still being applied. The aim of this work is to investigate if this modality can aid in redefining treatment margins.

Methods and materials: 10 patients that were treated on tomotherapy were given an MVCT scan prior to and after 5 treatments. Using an automated fusion algorithm the necessary setup margin was investigated using bony landmarks in the patient. Internal margin were assessed by delineating the mesorectum and modeling this through discrete points, allowing the development of a model for internal movement at different levels.

Results: Based on bony landmarks movement of patients during treatments is limited to resp 2.45mm, 1.99mm and 1.09mm in resp the lateral, longitudinal and y-direction. Systematic errors and rotations around the three main axes were limited to less than 1mm and 1°. The measured movement of the mesorectal space was of -1.6mm (SD 4.2) for the left lateral direction and 0.1mm (SD 4.0mm) for the right lateral direction. The mean shift in anterior direction was -2mm (SD 6.8mm) and -0.4 (SD 3.8)mm for the posterior direction. Mean shifts in the cranio-caudal direction were resp. -3.2mm (SD 5.6mm) and -3.2mm (SD6.8mm).

Conclusion : The use of the integrated MVCT on the tomotherapy system allows daily minimization of the setup margin for rectal cancer patients but also can be used to adequately model the internal margin and allows for a direct treatment margin adaptation.