

AbstractID: 9384 Title: Dose summation for multi-phase Helical Tomotherapy plans

Purpose: Develop a method to combine dose matrices from multi-phase Tomotherapy plans to facilitate dose escalation clinical trials.

Method and Materials: For many clinical sites it is customary to use treatment plans consisting of 2-3 phases. Currently the Tomotherapy treatment planning system doesn't provide a method to combine these phases, thus hampering the ability of clinicians to review dose volume information. We propose a simple method to create a composite plan which could be evaluated on a tertiary treatment planning system (TPS). Dose matrices from approved Tomotherapy plans for each phase are extracted and exported to a temporary location. A software algorithm was developed to read each distribution and perform a pixel by pixel summation. The final dose matrix was reviewed and placed in a format compatible with Pinnacle-TPS. The dose matrix was then registered with the image set in Pinnacle facilitating composite plan evaluation. The accuracy of the method was tested using ion chamber and film measurements. Film dosimetry was performed using EBT-Gafchromic film, Epson flatbed scanner and our in-house film dosimetry protocol. The measured dose distributions were compared with values calculated by Tomotherapy at the location of the film and summed using this method. Dose distributions were compared using the γ -index.

Results: The x,y,z registration errors between the composite dose matrix and the image set of the TPS were found to be 0.6mm for x-y axes and 1.5mm for z-axis. Ion chamber measurements were within 1-2%. Good agreement (low gamma, high conformity index) was recorded using film dosimetry

Conclusion: This summation method provides a fast, accurate, and simple way to evaluate multiphase composite treatment plans. The method can be used to sum dose distributions provided by different treatment planning system or to perform dosimetric comparisons between plans from these systems.