

AbstractID: 9555 Title: Comparing Deformable Composite Planning with Conventional Composite Planning

Purpose: A major concern when planning radiation treatments to previously irradiated patients is the possibility of overlap of radiation fields with those of previous treatments, so accurate dose mapping from previous plans is essential. Current composite planning does not account for anatomical variations between courses when mapping previous dose. The purpose of this work is to demonstrate proof of principle that treatment planning based on deformable image registration can be implemented on a commercial treatment planning system. (Pinnacle³, Philips Healthcare, Milpitas CA)

Methods and Materials: Three thoracic patients were selected from our institution using an IRB-approved retrospective chart review. Conventional and deformable composite plans were created for 2 patients whose courses were separated by 23 (Patient A) and 67 (Patient B) months. Conventional, deformable, and inverse deformable composite plans were created for the third patient (Patient C) who underwent re-planning 11 days after the initial planning during a single course of treatment. Computer scripts were developed and run to merge course information and enable inverse planning on merged datasets with deformed dose distributions. Dose volume histograms (DVH) of the lungs, heart, spinal cord, and target volumes were created.

Results: For Patients A and B respectively, 10% of the planning target volume for the deformed composite plan received more than 88Gy and 124Gy versus 70Gy and 94.6Gy for the conventional plan. For Patient C the gross tumor volume receiving 95% of the prescribed dose was 96.5%, 93.75%, and 99.54% for the conventional, deformed, and inverse deformed composite plans respectively. There was little change in DVHs of critical structures for all plans.

Conclusion: Deformable composite planning has the potential to identify issues that are not seen in conventional composite planning. Furthermore, inverse deformable composite planning has the ability to increase target dose uniformity, but the deformable registration still needs to be validated.