

Purpose: To compare IMRT plans delivered with a conventional linear accelerator (Varian 2100EX) and a Helical Hi-Art Tomotherapy accelerator and the dose differences to critical organs and structures surrounding the tumor volume.

Method and Materials: Five patient plans were generated using both the Varian Eclipse treatment planning system and the Tomotherapy treatment planning system. A sampling of different treatment sites were chosen for the study, which include an esophagus, a hilum/lung, a para-aortic, a pelvis, and an orbital case. IMRT plans were created with the goal of reducing dose to surrounding critical organs and structures while achieving similar satisfactory target coverage. Radiation doses were taken at three volumes of 25%, 50% and 75% for comparison. Also a mean dose and a max dose for spinal cord are provided. The plans generated represent the best dosimetric effort within clinically permitted time frame.

Results: The critical organs for each case are highlighted in yellow in the supporting documentation. Tomotherapy plans show an average improvement of mean doses to the critical organs by 31.83% over the conventional linear accelerator plans. For spinal cord doses, the average improvement of maximum doses shows an 18.75% advantage to the Tomotherapy plan over the conventional linac.

Conclusions: Examination of the dose volume histograms determined that the Tomotherapy unit was superior for thoracic cases, significantly reducing total lung doses. In most cases, the data show that the Tomotherapy plans provide better overall dosimetric characteristics. Also note that only five cases were compared in this study but similar results can be expected in most other cases.

Conflict of Interest (only if applicable): NA