AbstractID: 3296 Title: Optimization of Treatment Plans for Extracranial Stereotactic Lung Radiotherapy – RTOG 0236

Purpose: To evaluate a computer-assisted methodology that optimizes 3-D conformal radiotherapy treatment plan with minimal human intervention. The intent was to maximize the planning target volume (PTV) dose while minimizing the dose to normal tissues for stereotactic radiotherapy of lung tumors.

Method and Materials: The Elekta Stereotactic Body Frame (SBF) immobilized the patients and provided stereotactic coordinates for localization of the PTV. Registration plates uniquely and reproducibly positioned the SBF on the CT-simulator and linac couches. Consequently, we could obtain a mathematical transform between linac couch coordinates and stereotactic coordinate system defined by Elekta Prec*i*sePLAN (EPP) planning system. We measured linac couch and gantry angles that avoided collision of the gantry with the registered SBF and couch for representative treatment positions. This data allowed creation of templates for EPP, each consisting of over 40 non-coplanar beams arranged approximately 30 degrees apart. In addition to PTV and organs at risk, two contoured anatomical structures aided in optimization and evaluation of the treatment plans: a rind around the PTV and a rind of tissue adjacent to the patient's skin. Unattended optimization took about 45 minutes after setting the DVH specifications in EPP's aperture-based optimization tool for appropriate contoured anatomy. We selected 7-10 beams with greatest number of monitor units (typically, >350 per fraction) for the final plan. Evaluation of the treatment plans employed the following statistical indicators: %PTV encompassed by the prescription dose, ratio of the 50% prescription volume to PTV, and maximum dose > 2 cm from the PTV.

Results: Comparison of statistical indicators for several clinical cases showed that the unattended optimization was favorable to that by a human operator in less time and effort.

Conclusions: This methodology can increase the efficiency of 3-D conformal treatment planning.

Conflict of Interest: Partly funded by Elekta, Inc., Norcross, GA.