

## Inverse Beam Angle Optimization in IMRT for Lung Cancer Patients

**Purpose:** The purpose of this study was to develop a method of beam angle optimization in intensity-modulated radiotherapy (IMRT) for lung cancer patients to achieve an optimized IMRT plan for the patients.

**Method and Materials:** Twenty lung cancer patients treated in our institution were randomly selected for this study. For each patient, about 19 beams were pre-selected based on the experience of the clinical practice in our institution, then a home-built automated planning program was used to obtain an optimized IMRT plan by Pinnacle treatment planning system. Based on the beam weights, 5-7 beams were selected from 19 beams and a final plan (BAO Plan) was generated by the automatic planning program. The results were compared to those in the clinical approved plans (Clinic Plan).

**Results:** On average for all 20 lung cancer patients, the dose that 95% of planning target volume (PTV) received and the mean dose of PTV were slightly higher in the BAO Plan. The volume received dose of at least 5 Gy (V5) for total lung was decreased by 2.56, V10 by 1.85, and V20 by 1.83. The mean lung dose was reduced by 0.8Gy. The dose in the volume less than 1cc of spinal cord was decreased by 5.85Gy; V50 for esophagus was decreased by 2.70. V50 for the heart was increased from 6.42 to 8.91. The BAO plans had better dose distributions.

**Conclusion:** Compared to currently clinical practice in our institution, the proposed method of inverse beam angle optimization using our home-built automated planning program could provide a more optimal IMRT plan which has similar target coverage of PTV and better critical structure sparing for total lung, spinal cord, and esophagus for lung cancer patients.