AbstractID: 13510 Title: Dosimetric impact of beam margin on 3D conformal treatment plan in the lung cancer Stereotactic Body Radiotherapy

Purpose: This work investigates dosimetrically how beam margin (BM) affects characteristics of 3D conformal lung cancer stereotactic body radiotherapy (SBRT) treatment planning in terms of the conformality index (CI), high-dose spillage and intermediate-dose spillage.

Method and Materials:

Ten patient plans were generated in the Eclipse treatment planning system using the Anisotropic Analytical Algorithm (AAA) for BM of 0, 2 and 4 mm, respectively. All plans were normalized so that at least 95% of PTV receives the prescription dose and 99% of PTV receives at least 90% of the prescription dose. The high-dose spillage was defined by the ratio of the volume of all tissue outside the PTV receiving a dose larger than 105% of the prescription dose to the PTV, and the intermediate-dose spillage was evaluated by the mean dose at the 3mm shell distanced at 2 cm away from the PTV surface.

Results:

The CIs are much lower for 0 or 2 mm BM than those of 4 mm BM for all patient plans while for two patients, slightly higher for 0 mm BM than those for 2 BM. The high-dose spillages were on average about 7% lower for 0 or 2 mm BM than those of 4 mm BM for all patient plans while for three patients, higher for 0 mm BM than those of 2 mm BM. The intermediate-dose spillages were lower for 0 or 2mm BM than those of 4 mm BM.

Conclusion:

With assumption that PTV fully covers the microscopic disease, tumor motion and setup uncertainty, and following recent ASTRO/ACR guideline that every effort should be made to minimize the volume of surrounding normal tissues exposed to high dose levels, 3D conformal lung cancer SBRT plans appear superior with 2 mm BM or less depending on the tumor location, size and patient geometry.