AbstractID: 13608 Title: Using Generalized Equivalent Uniform Dose to Evaluate Dose Distributions in NSCLC Patients Planned for Stereotactic Body Radiotherapy

Purpose: To use generalized equivalent uniform dose (gEUD) to evaluate the dose distributions of patients with non-small-cell lung cancer (NSCLC) planned for stereotactic body radiotherapy (SBRT).

Methods and Materials: Thirty-eight stage I-II lung cancer patients with 41 lesions treated with SBRT were analyzed. For each patient a Pencil Beam (PB) algorithm-based treatment plan was produced. Monte Carlo (MC)-based treatment plans were calculated using the same number of monitor units, for each beam, as in the PB-based plan. Spearman rank correlation coefficients between gEUD with different parameter *a* values and dose-volume endpoints *Dx* and *Vx* were computed and compared. The effects of PTV diameter on dose differences between PB-based plans and MC-based plans were also analyzed using gEUD.

Results: The Spearman rank coefficient as a function of the *a* value in the gEUD produced functions with unique maxima for the PTV (0.995) and normal lung tissue (0.989). For PB-based plans, the parameter *a* correlated best with V5, V10, V20 and D95 for *a* values of 0.7, 0.9, 2.2 and -24 respectively. For the MC-based plans, these values of *a* were 0.8, 1.1, 2.4, and -22, respectively. gEUD differences between MC- and PB-based plans were found to be inversely proportional to the PTV diameter. These differences were found to increase with decreasing values of *a*, as the gEUD converges to the minimum PTV dose.

Conclusion: Spearman rank analysis showed good correlation between gEUD and dose-volume endpoints as a function of the *a* parameter in the gEUD model. Further investigation is needed to correlate these *a* values with biologically meaningful results for tumors and normal tissues in the context of lung SBRT in the clinical setting.

Work supported in part by NIH_R01-CA106770