Abstract ID: 17560 Title: Comparison Between the Dose Distributions Calculated for Lung Cancer Patients Using Pencil Beam and Collapsed Cone Convolution Algorithms

Purpose: To determine the variation in the dose distribution calculated using two different treatment planning algorithms for several lung cancer cases.

Method and Materials: 20 lung cancer patients received lung radiotherapy treatment developed by a treatment planning system which uses a pencil beam (PB) algorithm to calculate dose. Of these cases there were no complications and three local recurrences. These cases have been reevaluated using a treatment planning system which utilizes a collapsed cone convolution superposition (CCCS) algorithm which has been shown to more accurately correct for the inhomogeneous effects that occur in lung tissue. The two dose distributions were compared dosimetrically for several dose parameters.

Results: Dosimetric review of the treatment plans for several lung patients indicated that calculations using the pencil beam algorithm resulted in large errors in dose. The CCCS treatment plan indicated that none of these patients received the prescribed dose. The PTV received $\leq$ 80-90% of the prescription dose over most of its volume. It was also observed that the PB algorithm predicted a larger lung dose than did the CCCS algorithm.

Conclusion: This work indicates that dose distributions calculated using a pencil beam results in an over estimation of delivered dose to the tumor and an underestimation of dose delivered to the lungs. Despite the under dosage of the PTV only three cases had local control failure. Additional research is needed to determine why 85% of these cases were successful despite the dose calculation under estimates.