AbstractID: 13682 Title: Dosimetric analysis of matching 6 MV photon and electron fields in chestwall treatment

Purpose: To investigate dose distribution for matching 6MV photon and electron fields in chestwall treatment.

Method and Materials: A rectangular water equivalent phantom was used to investigate dose distribution at junction of adjacent photon and electron fields. Both 3D and simple IMRT plans have been created for photon fields. Electron plans with different electron energy were created and normalized to 90% iso-dose line. Photon and electron fields were matched based on skin markings. Monte Carlo simulation has been applied for photon plans. We compared plans with a single photon-electron match line to "mixed treatment" plans using 2 photon-electron match lines (ie day1/day2)

Results: Hot spots are observed at junction of photon field for all energy electron fields. The highest dose are 129%, 134%, 137%, 139% and 139% of dose for 6, 9, 12, 16 and 20 MeV electrons, respectively, with 6MV photon fields. The depths of these hot spots from skin surface are 1.5, 2.5, 3.4, 4.6 and 5.5cm, as compared with d_{max} for the electron fields individually (1.4, 2.2, 3.0, 3.0 and 2.0 cm, respectively). The hot spots for "mixed treatment" arrangement (day 1 and day 2) are 120%, 123%, 126%, 129% and 130% of dose, much lower than for the single match-line fields. The depth for hot spot for day 1 and day 2 arrangement stays similar with day1 treatment. Results from Monte Carlo simulation agree with pencil beam dose calculation algorithm in skin region.

Conclusion: Hot spots are reduced to clinically acceptable level by mixed treatment arrangement with two or even more matching lines between photon and electron fields. Further study is warranted to compare these results with intensity and/or energy modulated electron treatment, which may provide a more homogeneous dose distribution for chestwall treatment.