AbstractID: 11858 Title: Compartmentalized Modulated Electron and Photon IMRT Planning

Purpose: Electron radiotherapy is an option for shallow tumors due to sharp distal falloff. Optimization tools to perform Modulate Electron Radiotherapy (MERT) plans using photon MLCs produced promising results. This study optimizes MERT with IMRT for targets that can't be treated alone with electrons. **Methods and Materials:** Distances from the external contour to PTV distal border were calculated from CT scans of a post-mastectomy chest wall patient, and mapped onto a beams eye view plane. This map is converted to an energy map by binning effective depths. A MERT plan was done for the PTV portion that can be treated with MERT using the MERTgui that can interactively shape fields. Treatment head simulations using BEAMnrc and MCSIM Monte Carlo dose calculations were performed for apertures separately and resulting dose were then combined with different weights using another gui. Dose from the MERT plan was exported to Eclipse and the IMRT-PTV was generated by subtracting MERT-PTV from the original PTV. This new PTV was divided into sub-ptv regions to provide reasonable gradient between the distal and proximal subsections of the new PTV relative to the MERT-PTV. The IMRT plan was then optimized and combined with the MERT electron plan in CERR. **Results:** Compartmentalized MERT+IMRT plan resulted in good target organ coverage while decreasing dose to organs at risk such as heart, contralateral lung, but increased dose to the ipsilateral lung. With the MERT+IMRT plan, D20 decreased from 21Gy to 4Gy for heart, and 11Gy to 2Gy for contralateral lung, while increasing dose from 27Gy to 33Gy for ipsilateral lung. **Conclusion:** A four step optimization process in which optimization tools were devised to plan compartmentalized MERT and IMRT. Compartmentalized optimization of MERT and IMRT allows planning of targets that were not ideal for MERT-only planning.