AbstractID: 13713 Title: Modulated Electron Radiotherapy for Bilateral Chest Wall Treatment

Purpose: To evaluate modulated electron radiotherapy (MERT) planning for delivery with the photon multicollimator (xMLC) for treatment of bilateral post-mastectomy chest wall treatment. Current techniques are complex, time consuming, and deficient in terms of target coverage and organ at risk (OAR) sparing. Conventional techniques require blocks and energy modifying bolus, while IMRT is volatile due to patient motion and provides unnecessary dose baths.

Materials and Methods: An in-house Monte-Carlo-based MERT planning system has been developed for planning bilateral chest wall (MERT-biCW) treatment aided by previously developed in-house MERT optimization tools. The MERT-biCW planning was performed in three steps: 1) determine the number of portal fields needed to cover a PTV and partition the PTV into sub-PTVs for corresponding portals; 2) each sub-PTVs is then planned with MERT individually incorporating multiple energy assigned segments within each portal; 3) optimizing all portals to achieve the final plan. Several new features have been added to our MERT planning tools including; automatic selection of the best incident angle for each portal, whereby the distal surface of the tumor will be reached by selected energy and minimizing the air gap to <5 cm to maintain dose conformity. An algorithm has been developed to obtain optimal segments to facilitate target coverage and OAR sparing.

Results: We typically covered the PTV with four portals for biCW. For a challenging case, we achieved acceptable PTV coverage with 80% isotope line covered by the prescription dose, and significantly reduced doses to OAR compared with conventional therapy. The V20 of left lung was reduced from 45.5 Gy to 36.9 Gy. V20 of heart was reduced from 18 to 5 Gy.

AbstractID: 13713 Title: Modulated Electron Radiotherapy for Bilateral Chest Wall Treatment

Conclusions: MERT-biCW with its well-defined ranges and sharp fall-off is a promising alternative to conventional or IMRT post-mastectomy chest wall (CW) irradiation.

Research is sponsored by Varian Grant.