Dosimetry Impact of Absorbed Dose to Tumor and Organ at Risk on Mixed Beam Planning for Cervical Cancer

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Objectives: This study aims to determine the dosimetric impact of mixed energy plans for Carcinoma Cervix in the form of 3DCRT. Plans were differentiated based on PTV, Rt femoral head, Lt femoral Head, Rectum, Urinary Bladder, and bowel bag.

Methods: A cohort study of 20 cervix cases involving lymph nodes was selected for this study. They have previously been treated by a single oncologist at KYAMCH Cancer Center. For each cervix case, we use single-energy plan (6 MV photon energy), single-energy plan (15 MV photon energy) and mixed photon energy plans (6MV and 15 MV energy). First, we use single beam photon energy (6MV) & (15 MV) individually for both the primary and boost plan. Second, we used both 6MV & 15 MV as mixed energy plans for both the primary and boost plans. The prescription dose was 50 Gy 25 days per fraction for 20 cases. The target coverage was evaluated with the value of Mean Dose, Maximum Dose, and V95% coverage for 98%.

Results: The dose to rectum is higher in the single energy photon plan of 15 MV than single energy photon plan 6 MV and mixed photon energy plan (6 MV and 15 MV mixed). The mean dose to the Rt femoral head is higher in the mixed energy plan than the individual single photon energy plan, but for the Lt femoral head, the mean dose is higher in 15 MV energy (single photon energy plan). The mean dose to the urinary bladder is higher in the 15 MV individual single photon energy plan than individual single photon energy plan 6 MV and mixed photon plan 6MV and 15 MV. Bowel Bag dose at 195cc coverage, we get a higher dose in mixed energy form (6MV & 15 MV) than in individual 6MV & 15 MV photon energy plans.PTV coverage for individual 6 MV photon beam 97.113% =4607.33 cGy coverage for 15MV individual single photon energy 97.97%=4669.16 cGy and for mixed photon energy 6 MV and 15 MV 97.38 %=4641.66 cGy.

Conclusion(s): The initial result from this pilot study suggests that the mixed beam planning of 3D CRT cervical cancer could minimize the dose to the rectum and bladder but result in a higher dose to the Rt femoral head and bowel bag dose.