AbstractID: 3608 Title: Mixed beam energy for IMRT treatment of prostate carcinoma

Purpose: To investigate the technical and dosimetric properties of IMRT plans for prostate carcinoma using standard beam orientations with mixed beam energies.

Method and Materials: A cohort of 10 patients previously treated with IMRT for prostate carcinoma was selected. For each patient, three additional IMRT plans were calculated using a standard coplanar 5-beam arrangement and compared to the delivered treatment plan. All plans used 6 MV for the anterior oblique fields and the posterior field, while the two posterior oblique fields were either 10, 15, or 18 MV. An identical set of constraints was used for the PTV and organs at risk (rectum and bladder) and all plans were normalized to give 95% PTV coverage at 100% of the prescription dose. Competing plans were analyzed based on DVH, conformity index, total body integral dose (photon and neutron), and the total and compartmentalized number of MU.

Results: Equivalent conformity of dose to the PTV was achieved in all plans. The photon integral dose and number of MU, however, were significantly higher for plans with only 6 MV beams, while the 6/18 MV combination resulted in the lowest value for each of these parameters. For the 6/15 and 6/18 MV plans, the number of MU to be delivered with the pair of higher energy beams was found to be comparable to the number of MU delivered in a standard 4- or 6-field 3DCRT beam arrangement.

Conclusion: While the neutron integral dose rapidly increases beyond 10 MV, its magnitude in a mixed beam energy plan has been shown to be comparable to the neutron dose encountered in 3DCRT for prostate carcinoma. The resulting decrease in photon integral dose achieved in IMRT plans with mixed beam energies may thus suggest the selection of higher energy for those beams requiring the greatest tissue penetration.