AbstractID: 14125 Title: Radiotherapy of Patients with Bilateral Hip Replacement using Volumetric Modulated Arc Therapy (RapidArc)

Purpose: To investigate a volumetric modulated arc therapy (RapidArc)-based scheme to improve dose homogeneity, target coverage and organ at risk sparing in prostate cancer patients with hip replacement. **Method and Materials:** RapidArc (RA) treatment plans for previously treated 7 prostate patients with hip replacement are generated and compared with the IMRT plans used in their treatments. The total prescription dose of 50.4 Gy is delivered in 28 fractions of 1.8 Gy/fraction. Organs at risk (OARs) include bladder, rectum, small bowel and femoral heads. Magnetic Resonance images are co-registered with computed tomography images to correctly delineate prostate volume. Inhomogeneity correction is turned off for both IMRT and RA plans. Single (sRA) and double (dRA) RapidArc plans are generated and compared with the seven-field IMRT plans. Two 60-degree lateral sectors between 60-120 degrees and 240-300 degrees were skipped to avoid irradiation through the high Z materials in the hip. All plans are optimized and normalized to provide a minimum of 94% target coverage with the prescription dose. **Results:** The maximum PTV doses are 54.5Gy (IMRT), 57.1Gy (sRA) and 52.8Gy (dRA). Overall, dRA performed better in PTV coverage, dose homogeneity and the OAR sparing than did sRA and IMRT. For instance, V_{100} for rectum is 13%, 30% and 50% with dRA, IMRT and sRA. Homogeneity index (HI) is 103.5%, 106.7% and 109% for dRA, IMRT and sRA, respectively. The total monitor unit is 968 MU (IMRT), 429 MU (sRA) and 518 MU (dRA). **Conclusion:** RapidArc with one and two arcs is investigated in prostate cancer patients with hip replacement. Only RapidArc with two arcs (dRA) showed some improvements in OAR and healthy tissue sparing, target coverage and dose homogeneity with respect to IMRT. The treatment delivery is more efficient with single arc RapidArc. **Conflict of Interest:** Sponsored by Varian Medical Systems, Inc.