AbstractID: 10591 Title: The Dose Calculation of Pelvic Radiotherapy in Presence of Hip Prosthesis

Purpose: To compare the dose distributions based on corrected Megavoltage cone-beam CT (MVCBCT) images and conventional kilo-voltage (kVCT) images for patients with hip prosthesis artifacts. **Method and Materials:** The study retrospectively analyzed the dose distribution of two pelvic patients with hip replacement. For these patients, the original kVCT images, plans, contours and the first MVCBCT images were used. A diffusion filter and a patient-specific phantom-based correction method were used to correct the cupping artifact. The missing anatomy due to the limited field-of-view of the imaging system was compensated with the kVCT images acquired for treatment planning. Three plans with the same isocenter, beam orientations, beam weights, segment weights, multileaf-collimator shapes and monitor units (MUs) were created on the treatment planning system (Pinnacle 8.0m, ADAC). Two plans were created on the kVCT, with (Plan1) and without (Plan2) manually overwriting the densities of the hip prosthesis and bones to their actual density and the soft tissue to water. The third plan (Plan3) was created on the corrected MVCBCT. All calculations were performed with heterogeneity correction. **Results:** The DVH showed good agreement between the three plans for the organs-at-risk. Depending on the severity of the artifacts, the change in the target, bladder and rectum mean dose for Plan1 (Plan2) compared to Plan3 ranged from -3.2% to 0.29% (-2.53% to -0.09%) and maximal target dose difference ranged from -4.73% to 0.26% (-3.8% to 0.21%). **Conclusion:** From this study, the process of overwriting the densities tended to underestimate the dose to the target. Doses calculated without the density of prosthesis and surrounding artifacts overwritten were similar to that calculated with the corrected MVCBCT images. In addition to providing accurate densities for dose calculation, MVCBCT also helped to delineate the anatomy in presence of prosthesis. **Conflict of Interest:** This work is partly supported by Siemens OCS.