AbstractID: 12634 Title: Evaluation of treatment shifts for prostate and rectum patients undergoing CBCT guided IGRT using kV CBCT

Purpose: We present results of a pilot study established to investigate protocol to access inter-fraction setup errors for patients with rectal and prostate cancer receiving CBCT based IGRT. We also report on radiation skin doses to patients from a typical CBCT acquisition for daily patient positioning using previously established 2D reference radiochromic film dosimetry protocol.

Method and Materials: Patients receiving radical course of IGRT based treatment using CBCT were eligible. Pre-treatment 3D imaging of 20 patients in treatment position was acquired using kV CBCT onboard imaging (OBI) system (v. 1.4, Varian Medical Systems, Palo Alto). Scans were preformed using Pelvis CBCT protocol. Reconstructed CBCT images obtained prior to treatment were co-registered with planning CT data set using bony landmarks for rectal cancer patients and prostate soft tissue visibility and prostate contours for prostate cancer patients. For dose measurements we used 2D dosimetry protocol that employs XR-QA radiochromic film.

Results: Our measurements show that average displacements over investigated rectal cancer patient population was 3.68 ± 1.51 mm in vertical, 3.18 ± 2.0 mm in lateral and 1.59 ± 1.34 mm in longitudinal direction with the maximum observed shift in lateral direction of 11 mm. Average displacements over prostate cancer population showed 2.29 ± 1.69 mm in lateral, 3.36 ± 2.06 mm in vertical, and 3.36 ± 2.06 mm in longitudinal direction with the maximum shift observed in vertical direction of 18 mm.

Measured anterior dose during CBCT amounts to 1.60 cGy in larger and up to 3.17 cGy in smaller patients, while the lateral dose was ranging from 1.63 cGy in larger and up to 2.68 cGy in smaller patients.

Conclusion: Our investigation showed that 3D conformal therapy with reduced margin in all 3 directions can be used for prostate and rectal cancer patients undergoing daily CBCT based IGRT. However, this benefit must be weighted against dose delivered to patients during CBCT.