AbstractID: 11235 Title: Interfractional Geometric and Dosimetric Variations in Prone Breast Irradiation

Purpose: To quantitatively evaluate interfractional variations in treatment setup and their dosimetric effects, in prone breast irradiation based on daily kVCT acquired during IGRT.

Materials/Methods: In-house study enrolling patients with prone breast irradiation to be treated on linac and CT-on-Rails combination (CTVision, Siemens) is on going. Patients with surgical clips placed in the lumpectomy cavity who fit through standard bore CT with field of view sufficient to image the whole treated breast are selected. Patients were setup prone with shifts made from a PA set up point to the isocenter. Registration was adjusted manually to achieve visual agreement between the daily and planning CTs using the cavity in conjunction with surgical clips. Daily CT data and repositioning shifts acquired for 15 patients were analyzed. Dose plan delivered with CT guidance (IGRT plan) for each treatment was reconstructed in the planning system (Xio, CMS) by placing the original beams on CT of the day with the corresponding shifts. In addition, the dosimetric plan with the patient shifts based on 2D portal images (non-IGRT plan), as conventionally practiced, was reconstructed. Dose-Volume-Histograms (DVH) for PTV and organs-at-risk (OAR) for the IGRT, non-IGRT and original plans were compared.

Results: The daily shifts are patient dependent. Comparison of variations of D95 and D50 values shows higher interfractional variability for non-IGRT plan. Average D95 was 1-2% lower for non-IGRT plans than IGRT plans, with some fractions receiving as low as 91% of planned dose. IGRT plans showed improvement with minimum D95 of 95% of planned D95. Effect of the repositioning on the OAR DVH is patient specific and depends on the location of the cavity.

Conclusion: The interfractional variations in patient setup and anatomic changes, and their dosimetric impact, in prone breast irradiation are significant, and can be reduced with IGRT based on kV fan-beam CT.