AbstractID: 12565 Title: Assessment of patient setup corrections in external beam radiotherapy using on-line kilo-voltage imaging

Purpose: Image-Guided Radiation therapy (IGRT) has evolved as a new and better tool for accurate patient setup in radiation therapy. The purpose of this study was to assess patient setup corrections in external beam radiotherapy for head-and-neck, breast and prostate tumors by using on-line kilovoltage (kV) imaging.

Method and Materials: Patient position corrected values resulted from on-line orthogonal kV image matching with DRR were retrospectively collected for three different treatment sites: head-and-neck (H&N) (n=19), prostate (n=14) and breast (n=10). The systematic and random setup corrections for each individual patient and the groups were calculated and compared between different treatment sites.

Results: For H&N patients, the overall systematic and random setup errors were 0.6 ± 3.0, 0.1 ± 3.6 and -1.2 ± 3.8 mm in the left-right (LR), anterior-posterior (AP) and superior-inferior (SI) directions, respectively. Individual systematic errors greater than 5mm were observed in only 1 of 19 (5.2%) H&N patients. Compared with H&N patients, prostate patients showed similar overall systematic and random errors (0.1 ± 6.4, 0.3 ± 3.9 and 0.6 ± 3.6 mm in the LR, AP and SI directions, respectively). However, a relatively larger fraction (21.4%) of prostate patients had individual systematic offsets greater than 5mm. The overall systematic errors (1.3mm in LR, -2.7mm in AP and 0.6mm in SI) in breast patients were similar to the other two sites. However, significantly larger random setup errors (6.9mm in LR, 4.5mm in AP and 5.7mm in SI) were observed in breast patients

Conclusion: Our study showed that the systematic errors for all anatomic sites are all smaller than 3mm. However, relatively large systematic errors were observed in some individual patients. The random setup errors were found larger in breast patients than other two anatomic sites. These observations support that IGRT is an important and necessary tool in improving the patient setup accuracy.