AbstractID: 11339 Title: Determination of skin mark based patient setup errors using OBI and CBCT for head and neck patients and investigation of the dosimetric impact of the errors on IMRT treatment

Purpose: To determine the skin-mark-based patient setup error using On Board Imaging (OBI) and cone-beam CT (CBCT) for head and neck patients, and to determine the CTV-PTV margin necessary to compensate for this setup error for IMRT treatments.

Method and Materials: A total of 50 patients were analyzed for this study. All patients were first set up by aligning skin marks with lasers. Before the delivery of first treatment, a CBCT image was acquired to determine the final treatment position. OBI images were acquired for the subsequent 4 fractions. This weekly image acquisition protocol was followed for all patients until treatments were completed. Shift data were measured for a total of 1064 OBI fractions and 313 CBCT fractions. These data were compared statistically. Correlations between the CBCT and OBI data and among the OBI data were analyzed. The top 10 patients showing the largest setup error were selected to investigate the dosimetric impact of setup error using a 5 mm CTV-PTV margin.

Results: The mean ± sd of the shifts measured by OBI in the SI, lateral and AP direction were 0.6±2.9, -1.6±3.5 and -0.7±2.9 mm and those measured by CBCT were 0.1±2.9, -1.9±3.3 and 0.3±3.3 mm respectively. The correlation indices between the CBCT and OBI were 0.43, 0.59, and 0.38, and those among the OBI were 0.46, 0.34, and 0.53 along SI, lateral and AP directions respectively. For 9 of the 10 patients investigated, at least 99.5% of CTV volume received more than 95% of the prescription dose after accounting for the setup errors.

Conclusion: There is no significant difference between the patient shifts measured by OBI and CBCT. No correlation was found between the shifts for different fractions. A 5 mm CTV-PTV margin was found to be adequate to account for the setup errors measured in this study.