

AbstractID: 11483 Title: Repeated measures analysis of variance of patient specific daily margins to assess interfraction motion for cervical cancer patients undergoing IMRT using daily CBCT imaging

Purpose: To analyze interfraction motion in cervical cancer patients based on repeated measures analysis of variance of patient-specific daily uniform margins obtained using daily CBCT imaging

Methods and Materials: Ten cervical cancer patients (stage IB-IVA) treated with IMRT were analyzed for this study. A CTV consisting of the regional lymph nodes, upper vagina, parametria, cervix and uterus was contoured on the planning CT and daily CBCT images. Twenty-five CBCT scans, corresponding to each fraction were planned and attempted for each patient. The acquired CBCT images for all the fractions were rigidly registered to the planning CT with respect to bony anatomy. The initial planning CTV was then cast onto the registered daily CBCT and were modified to reflect changes due to organ motion and deformation. Patient-specific daily margins covering 100% of daily CTV volumes were calculated. Repeated measures analysis of variance (ANOVA) was performed on the patient specific daily margins to quantify inter-patient and intra-patient variations in estimated margins. Mean values within the subjects were imputed for the missing fractions. *F* statistics was used to test the null hypothesis that day of the treatment or fraction number had no effect on daily margins.

Results: Patient specific daily uniform margins were used to generate an ANOVA table. The data shows a grand mean of 15.3 mm among all patients and fractions which represents the estimate of the average population margin. In addition, the inter-patient standard deviation in margins is 5.1 mm and intra-patient standard deviation is 35.4 mm indicating that the variation between patients is significant. The *F* statistics ($F = 0.654$) was significant indicating that the day of the treatment or fraction number had no influence on margin.

Conclusion: Margins varied substantially between patients indicating adaptive RT approaches are needed for the treatment of cervical cancer patients.