

Abstract ID: 9085 Title: An investigation of intra- and inter-fraction motion in cervical cancer patients.

Purpose: To quantify the intra-fraction motion of the cervical vertebrae during a course of external beam radiation therapy. Also to develop patient-specific PTV margins that can account for the observed intra-fraction motion for cervical cancer patients.

Methods and Materials: Multiple sagittal T2-weighted MRI images were acquired throughout the central sagittal slice of the cervix of 6 patients undergoing external beam radiation therapy for cervical cancer. Images were acquired at 6-second intervals for approximately 20 minutes. MRIs were performed at three time points: pre-treatment, mid-treatment and post-treatment. Cervical contours were redelineated on all images using in-house software which also enabled quantification of motion and deformation. Using these contours, the extent of margin expansion to achieve 100% coverage was measured and used to construct customized PTV expansions.

Results: During each intra-fraction period a general trend was observed in that the cervix moved superiorly and posteriorly with time (up to 6 mm). This motion was observed to correlate with bladder filling. For each acquired time point, anterior motion increased as a function of treatment progression. Anterior PTV expansion increased from 2.2 mm to 6.6 mm while the inferior margin decreased from 7.0 mm to 3.1 mm. No systematic trends were observed in the posterior or superior directions when comparing scans acquired at different time points throughout the treatment.

Conclusions: This work suggests that as treatment progresses, significant changes in intra-fraction motion can occur. Further, each patient's motion is unique and requires individual assessment for custom PTV margin construction. Motion analysis may provide guidance as to when an IMRT boost would be most successful in replacing an interstitial brachytherapy boost.