

AbstractID: 8556 Title: Determining an appropriate margin around CTV to account for interfraction motion during IMRT for cervical cancer patients based on daily imaging

Purpose: To derive an appropriate CTV-to-PTV margin that will ensure delivery of 100% of the prescribed dose to 95% (on average) of daily CTV's during a treatment course.

Methods and Materials: Daily CBCT images are taken for setup of Stage I-IVa cervical cancer patients at our institution. Daily CTV contours drawn on these images take into account the effect of interfraction motion due to organ motion/deformation and tumor regression. To date, we have acquired CBCT data for 15 patients out of which 5 have been analyzed so far. On each CBCT, expert radiation oncologists manually segment CTV, bladder and rectum of that particular day. The CTV contours from all the CBCT scans of the same patient are superimposed on the planning CT scan after rigidly registering each CBCT scan to the planning CT scan. A uniform margin of 0, 3, 5, 7, 10, or 15 mm etc is added around the planning CTV and the average volume of CTV missed over all fractions is analyzed. The isotropic margin that encompasses 95% of daily CTVs on an average is considered adequate for the patient.

Results: Statistical analysis of 5 patient's shows that a 7 mm margin is sufficient to cover on an average 98% (min: 95.2, max: 99.6) of daily CTVs of these 5 patients. However a bigger margin of 15 mm is required to adequately cover the high risk cervix region. The mean of the standard deviations in average volume of CTV covered for these 5 patients at 7 mm margin is 2.4 % indicating large inter-patient variation. Analysis of more patients is required to reduce variation in average CTV volumes among patients.

Conclusions: Clinical implementation of CBCT imaging devices has made possible margin evaluation based on daily images that provides a more accurate means of accounting for interfraction motion.