

AbstractID: 13448 Title: A study on image guided radiotherapy using cone-beam computed tomography (CBCT) for head and neck cancer IMRT patient setup

Purpose: To use our CBCT shift results to determine how much of the CTV to PTV margin is necessary to compensate for the daily setup uncertainty inherent in the treatment of head and neck cancer patients.

Method and Materials: To accommodate the daily setup uncertainty, a 3-6 mm uniform margin is used for head and neck IMRT patients to expand CTV to PTV. In order to verify patient setup accuracy, CBCT is taken prior to the treatment. Our protocol calls for CBCT for the first five consecutive fractions, followed by two CBCT every week. Each CBCT is registered to the planning CT to determine the corresponding translational shift. The registration is based on the region-of-interest—the rigid bones near the tumor. On the days no CBCT is taken, the average of the previous three calculated translational shifts is used instead. No rotational correction is considered.

Results: A total of 22 head and neck IMRT patients were studied with a Siemens Artiste linear accelerator using an MVision CBCT scanner. Each patient had approximately 14 sets of CBCT images taken over the entire course of treatment. The average interfraction shift was 0.6 ± 1.6 , 1.4 ± 1.5 , 0.1 ± 1.6 mm in the anterior-posterior, left-right, and superior-inferior dimensions, respectively. These data indicate that in the absence of CBCT image guided radiotherapy, a CTV to PTV margin of 2.5, 4.7 and 1.3 mm is needed in the anterior-posterior, left-right, and superior-inferior dimensions, respectively.

Conclusion: Our results have shown that asymmetric margins of 2.5, 4.7 and 1.3 mm can be used for CTV to PTV expansion for head and neck cancer radiotherapy if no IGRT presented. Our CBCT protocol will allow a reduction in the CTV to PTV margin. Further investigation needs to be done to find out the specific CTV to PTV margin with different CBCT frequency.