

AbstractID: 12954 Title: Localizing a moving tumor using MV-CBCT

Purpose: To evaluate mega-voltage cone-beam computed tomography (MV-CBCT) imaging of moving tumors. **Method and Materials:** Five patients treated for early stage non-small cell lung cancer using stereotactic body radiation therapy (SBRT) were analyzed. Simulation images were obtained with a Siemens Sensation Open 4D-CT scanner. The Internal Target Volume (ITV) comprised of the tumor in each phase and on the free-breathing CT was created. Daily localization was performed with MV-CBCT on a Siemens Artiste linear accelerator with the in-line kView system, using a 4.2 MeV electron beam incident on a carbon target without flattening filter to increase the yield of low energy photons. The tumor was contoured on each daily CB image. The size of the ITV contours on the planning CT and MV-CBCT was compared in the anterior-posterior (AP), left-right (LR) and superior-inferior (SI) directions. **Results:** In the majority of cases the standard deviation of the MV-CBCT contour size from day to day was less than 2 mm. The average difference between the planning CT and MV-CBCT contours varies widely from patient to patient. The largest difference (10.1 mm) was seen in the SI direction for a patient for whom breathing motion was large (18 mm), and the contrast between the tumor and its surroundings in the expected tumor position during the full-inhale phase was reduced. The second largest difference (7.2 mm) was seen in the SI direction in a patient for whom the proximity of the tumor to a large blood vessel also reduced the contrast. **Conclusion:** There is a possibility of inaccurate registration between the planning CT and MV-CBCT and less effective localization when the contrast is adversely affected because of large tumor motion or proximity to other structures. This should be taken into account in the Planning Target Volume margin. Research partially supported by Siemens Medical Solutions.