AbstractID: 1304 Title: The correlation between respiratory tumor motion and external marker motion

Image-guided therapy, including respiratory gating methods, can be used to minimize the effects of respiratory tumor motion. Gating systems typically monitor external patient markers, and assume that the motion of the external marker is representative of the motion of the tumor. This study examines the relationship between external skin markers and abdominal tumors using fluoroscopic imaging and computer vision tracking techniques. Patients with abdominal tumors and implanted tumor markers were observed under fluoroscopy. Radio-opaque markers were placed on the patient's skin at midline from the xyphoid process to the umbilicus. Lateral fluoroscopy images, allowing visualization of cranio-caudal and anterior-posterior motion, were recorded for approximately 30 seconds of respiration. The motion of the tumor markers and the surface markers was quantified using computer vision tracking techniques. Tumor and external marker motion data were analyzed to examine the correlation between the two sets of markers. The results indicate that internal tumor motion is well correlated with external marker motion for abdominal tumors. In some cases, however, small amounts of external marker motion can correspond to large amounts of internal tumor motion. For all patients, the range of tumor motion observed was 5 mm to 2.5 cm, and the ratio of tumor motion to external marker motion ranged from 0.8 to 7.0. Serial motion studies will also be presented, in which the daily variations in the correlation of internal and external marker motion were investigated.