AbstractID: 1626 Title: Development of a Computer-Controlled Phantom to Simulate Tumor Motions Applied to Image Guided Adaptive Radiotherapy

A computer controlled dynamic dosimetry phantom was created to simulate tumor motion so that new techniques in radiation delivery could be tested for accuracy in radiation treatment. Previously existing phantoms followed sinusoidal patterns which did not represent actual tumor motion effectively. Therefore a two – dimensional computer controlled phantom was developed to replicate tumor movement more precisely spatially and temporally. Evaluating new radiation techniques, such as dynamic tumor tracking and linac gating, for exactness in these domains are important before clinical implementation of them. The design of the phantom composed of three main parts: a mechanical platform, an electrical interface and a computer system. The mechanical platform was required to hold the weight equivalent to the human torso, approximately 60 lbs, to mimic a patient's weight. The computer system sends coordinates using Microsoft Visual Basic to govern the platform movement. The electrical interface translates the information from the computer to move the mechanical platform. Patient tumor trajectories used for testing the phantom were collected using a real – time tracking system and projected into beam's eye view. A calibrated camera system was used to test the accuracy of the phantom's motion. The phantom was able to simulate the actual tumor trajectories in a predicable fashion, retracing the tumor movements. It also held more than the required weight while still executing precise movements. The phantom's ability to recreate variable patterns of movement enables researchers to test motion compensation systems before implementing them in clinical settings.