

AbstractID: 1724 Title: Dynamic thoracic surface acquisition using Digital Surface Imaging to monitor breathing motion: A feasibility Study

The application of precision techniques to thoracic sites has been limited by respiration-induced motion. Tumours in the thoracic and abdominal region typically can move from 1-3 cm during normal breathing. These uncertainties increase the PTV margin and consequently include more normal tissues. This limits the level of dose escalation that can be achieved for these targets and introduces an impediment to improving local control. We report a feasibility study on the dynamic acquisition of patient thoracic surface using Digital Surface Imaging system to monitor the patient breathing motion.

The Digital Surface Imaging system (DSI) consists of two stereoscopic video cameras, a LCD projector, and image acquisition and registration software. Well-defined dot patterns are projected onto the surface and the cameras simultaneously acquire sequences of 2D digital images. Using triangulation between the 2 stereoscopic images and the projected dots a 3D digital surface image is constructed.

We have acquired surface images dynamically of an oscillating cylindrical phantom and compared the motion with the data obtained simultaneously using Varian Respiratory Position Monitoring System (RPM). There was an excellent phase match as shown in Fig. 1. Also we have compared the motion data between DSI and RPM system for patients with lung cancer. The results again showed a good phase agreement between the two data sets. The results indicate that the DSI can be used as a tool to monitor breathing motion and produce breathing cycles.