AbstractID: 12758 Title: Initial Results of Real-Time External Surface Motion and Dose Monitoring Study for Lung Patients

Purpose: To describe results from an ongoing clinical trial that aims to evaluate the potential of the RADPOS system, which combines a MOSFET dosimeter and electromagnetic positioning sensor, for applications in external beam treatments for lung cancer patients. **Method and Materials:** Measurements were done at the time of each patient's 4DCT and throughout the course of treatment. Each day, three RADPOS sensors were positioned at marked points on the patient's chest and abdomen while a fourth detector was placed on the CT or treatment couch for reference. Position coordinates of the sensors and dose information can be read in real-time, but for these trials the total dose was read after each treatment fraction. **Results:** Measurements have been completed on ten patients during 7-14 fractions each. The standard deviation of the average dose measured at each point ranged from 3.0-13.7 cGy at CT zero and 2.5-11.1 cGy at the site of the tumour. Large differences were sometimes seen between data collected during the 4DCT and treatment fractions. Most patients settled into a more consistent breathing pattern as treatment progressed, with maximum interfraction variations in average amplitude and period between 0.9-3.5 mm and 0.2-1.8 s during treatment. A cross-correlation analysis comparing the displacements measured simultaneously at the three locations found that correlation varied between patients, as no two detectors were consistently the most correlated. The magnitude of the correlation coefficients also varied greatly, ranging from ρ=0.13-0.24 for Patient G and from ρ=0.74-0.81 for Patient E. **Conclusion:** RADPOS system can provide real-time feedback regarding motion due to breathing, coughing or other patient movement. Variations in breathing patterns are patient-specific and should be monitored to ensure accurate positioning and treatment delivery. **Acknowledgements:** This project is supported by grants from HTX and ORCC Foundation. Financial and technical support from Best Medical Canada is also acknowledged.