AbstractID: 8470 Title: Quantitative assessment of respiratory-induced lung tumor motion

Purpose: To quantitatively describe the magnitude and direction of lung tumor motion resulting from respiration as a function of the location of the tumor within the lung. **Method and Materials:** CT scans at end inhale and end exhale were acquired for 29 lung cancer patients at the Tom Baker Cancer Centre. Gross tumor volumes (GTV) at inhale and exhale, internal target volumes (ITV), and planning target volumes were delineated by a radiation oncologist. Centre of mass (COM) coordinates of the GTV at inhale and exhale were determined using Eclipse®, and the vector displacement of the GTV from inhale to exhale (magnitude and direction) were calculated. These results were scaled and presented graphically overlaying coronal and sagittal slices through the thorax of one patient. The ratio of the ITV to the GTV for each GTV was also calculated. **Results:** Summary data for the mean magnitude of vector displacement for left upper lobe, right upper lobe, left lower lobe, and right lower lobe are 9.60±5.25, 8.48±6.46, 16.18±14.95, and 18.10±12.63, [1S.D.] mm, respectively. The dominant direction of tumor motion is inferior to superior with a smaller anterior-posterior component. Non negligible lateral components depend on the location of the tumor within the lung. The ITV/GTV ratio is larger in the lower lobes than upper lobes and hence the potential benefit of margin reduction is greater in the lower lobes. **Conclusion:** Respiratory motion can restrict the dose which can be safely delivered to lung tumors. Detailed knowledge of the vector displacement of such tumors as a function of location within the lung not only highlights the issue but can be used as the basis for predicting the potential benefits of respiration compensating/accommodating techniques and their validation through clinically realistic phantom studies. **Conflict of Interest (only if applicable):** Varian provided partial support for this work.