Purpose: Involuntary motion of the tumor during the treatment of NSCLC using stereotactic body radiosurgery presents its own unique challenges. In this study, we quantify the impact of abdominal compression technique to minimize tumor motion as a function of location of tumor in a patient.

Methods: 25 patients (5 in each lung lobe viz. RUL, RML, RLL, LUL and LLL) were retrospectively analyzed. A 4DCT study encompassing the tumor was used on a 16 slice GE CT scanner along with Varian RPM gating system. The images were retrospectively binned in 10 phases. The motion of tumor was analyzed phase by phase in transverse, sagittal & coronal projections of the 3D image. This gave us 2 values for anterior-posterior, superior-inferior and lateral-medial motions each and was averaged out.

Results: Analysis of data reveals that the motion (mean ± 1SD) in the superior-inferior direction was 1.8 ± 0.9, 4.2±2.8, 7.4±2.3, 1.5±0.8, 3.1±2.8 mm for tumors located in RUL, RML, RLL, LUL and LLL, respectively. Along the anterior-posterior direction the respective values were 2.5 ± 1.9, 2.4 ± 1.1, 2.7 ± 1.3, 1.4 ± 0.2 and 1.8 ± 1 mm. Similarly, along the lateral direction, the respective values were 2.1 ± 1.1, 1.9 ± 1.1, 1.6 ± 1.3, 1.1 ± 0.3 and 1.8 ± 0.7 mm. When the data was analyzed removing the location of the tumor in the thorax, the median displacement along the superior-inferior, anterior-posterior, lateral direction was 2.3, 1.6 and 1.5 mm, respectively while the respective maximum value were 9.2, 5 & 3.8 mm.

Conclusions: The use of abdominal compression provides a simple inexpensive yet easily tolerable device to control the motion of the tumor in the management of NSCLC for SBRT treatments. This will allows the treatment of the tumor without resorting to complex and time consuming gated treatments.