Purpose:
This study aims to evaluate the effectiveness of compression in immobilizing tumor during stereotactic body radiotherapy (SBRT) for lung cancer.

Methods:
Published data have demonstrated bigger respiratory motion in lower lobe than in upper lobe during normal breathing. We hypothesize that 4DCT-based patient selection and abdominal compression would immobilize lung tumor volumes effectively, regardless of their location. We retrospectively reviewed 12 SBRT lung cases treated with Trilogy® (Varian Medical System, Palo Alto, CA). Either compression plate or Vac-LokTM was used as abdomen compression of the SBRT immobilization system (Body Pro-LokTM, CIVCO) to restrict patients’ breathing during CT simulation and treatment delivery. These cases are grouped into 2 categories: lower and upper lobe tumor, each with 6 cases. Records for 33 treatments were studied. On each treatment day, the patient was set up to the bony anatomy using kV-kV-match. A CBCT was performed to further set up the patient to the tumor based on the soft tissue information. The shifts from CBCT-setup were analyzed as displacement vectors demonstrating the magnitude of the tumor motion relative to the bony anatomy.

Results:
The mean magnitude of displacement vectors for upper lobe and lower lobe were 3.7±2.7 and 4.2±6.3, [1S.D.] mm, respectively. The Wilcoxon rank sum test indicates that the difference in the displacement vector between the two groups is not statistically significant (p-value = 0.33).

Conclusions:
The magnitude of shifts from CBCT were small with mean value <5mm in SBRT lung treatments. No statistically significant difference were observed in the displacement of tumor between lower and upper lobes. With limited sample size, this suggests that our current 4DCT screening/abdominal compression approach is effective in restricting the respiration-induced tumor motion despite its location within the lung. We plan to confirm this result in additional patients.