Purpose: To assess target movement for SBRT patients receiving hypo-fractionated radiation for lung. Knowledge of the magnitude of these movements can determine optimal margins around the GTV.

Methods: We use the Elekta stereotactic body frame (SBF) to deliver an average of four fractions to lesions of diameter less than 4 cm. The SBF is an effective immobilizer utilizing a vacuum bag that conforms to the body. A patient is set up reproducibly in the SBF using its laser pointers. Its fiducial marks are used to stereotactically localize the target. The SBF’s stereotactic coordinates are then used to set up the target to isocenter. We obtain a verification CT prior to each fraction for localization of the target. To quantify target movement, we have recorded its deviation from its initial position based on the treatment planning CT. We have then averaged these deviations over the number of fractions to obtain a mean deviation and its standard deviation per patient for each of the three directions.

Results: For 35 patients that have received SBRT for lung lesions, we have calculated the weighted mean, the error of the mean and the sample standard deviation for the three stereotactic coordinates, Lateral, AP and Longitudinal of the centroid of the GTV that was outlined by the same physician on each of the verification CT’s. The means are: -3.16 +/- 0.1, 1.27 +/- 0.09 and 0.66 +/- 0.31 mm. The sample standard deviations are: 4.33, 4.35 and 4.24 mm.

Conclusions: Internal target motion is the main contributor to its positional uncertainty for our SBRT setup. Assuming a normal parent distribution of the deviations, a uniform margin of 1 cm will provide sufficient coverage of the target for 98% of the times. This is confirmed by the actual distribution of our sample.