# AbstractID: 11074 Title: Experience and comparison of two image guidance methods for SBRT treatment: 4D CT and ExacTrac respiratory-triggered imaging

**Purpose:** For Stereotactic Body Radiation Therapy (SBRT) treatment of lung and liver, we quantified the differences between two image guidance methods: 4D CT and ExacTrac respiratory triggered images.
**Method and Materials:** 5 liver lesions and 1 lung lesion for a total of 21 fractions were studied. For the 4D CT method, a manual registration method was used between the 4D CT image sets from initial simulation and treatment day. 4D CT derived image guidance shifts were ascertained from comparison to the same breathing phase at simulation. We also used ExacTrac respiratory triggered imaging to verify the target positioning and calculated the differences in image guidance shifts for the two methods.
**Results:** The mean of the observed differences in image guided shifts between 4D CT image guidance and ExacTrac respiratory triggered image guidance was x = 1.6 mm, y = 1.9 mm, z = 2.8 mm, with no difference larger than 5.0 mm noted in any given direction for any individual case. As expected, the largest error occurred in S/I direction, with a mean of 2.8 mm for the six patients. This is expected because respiratory motion and the resulting uncertainties are most pronounced in this S/I direction. The ExacTrac images triggered at two extreme breathing phase, e.g., full exhale vs. inhale, agreed well (< 2.0mm) with each other.
**Conclusion:** The two very promising image guidance methods of 4D CT and ExacTrac respiratory triggered imaging have been presented and compared for SBRT of lung and liver. The mean differences in image guided shifts between the two methods were less than 3 mm, with no individual direction difference greater than 5 mm for the six SBRT patients, 21 delivered fractions evaluated in this study. Potential contributing factors to the disagreement were presented and will be studied further in future work.