

**Purpose:** To analyze the targeting accuracy using Exac-Trac® (BrainLAB) and Synergy® CBCT (Elekta) systems for lung SBRT, and discuss the difference between these two IGRT systems.

**Methods:** The target localization for lung patients treated with SBRT on Novalis® with Exac-Trac® system and on Synergy® with CBCT system was analyzed. Prior to each treatment, patient's setup correction using Exac-Trac® is performed by fusing (bone structure matching) two oblique x-ray images with related DRRs computed from the planning CT, the correction using the CBCT system is by fusing (grey volume registration) CBCT with the planning CT. The position error is adjusted by shifting the table in lateral, longitudinal and vertical directions. If the shifted distance is >5mm in one direction, we usually repeat the image capturing and fusing procedures to double check the position error—the “second” shifting distance. In this study, we used the “second” shifting distance to analyze the targeting accuracy for both systems.

**Results:** Sixteen and twenty-nine setup correction cases were studied for Exac-Trac® and Synergy® CBCT systems, respectively. The first shifted distances were in the ranges of 8.6-22.7mm and 3.5-18.3mm, with the average of 15.2mm and 8.2mm. The “second” shifting distances were in the ranges of 0.5-4.9mm and 0.6-3.4mm, with the averages of 2.8mm and 1.9mm, respectively. For both systems there was no correlation between the first shifted and the “second” shifting distances. The average position error after table shifting in Exac-Trac® was larger than that in Synergy® CBCT system. We think the 3D volume registration is more practical or accurate than the 2D imaging matching for soft tissue localization.

**Conclusion:** Using volume registration, Synergy® CBCT system is more accurate compared to Exac-Trac® system in IGRT for lung SBRT. Detailed comparison and discussion of targeting accuracy for different tumor locations between the two systems will be reported.