AbstractID: 13178 Title: Investigation of Intracranial Localization for SRS and SRT using MV-CBCT

Purpose: To investigate the accuracy and precision of Mega-Voltage Cone Beam Computed Tomography (MV-CBCT) localization for intracranial stereotactic treatment deliveries. **Method and Materials**: A Rando head phantom containing a metal ball bearing (BB) was mounted with a head frame. A treatment plan targeting the BB was generated and three localization methods were compared. The first, was the standard technique using laser micro-alignment to the isocenter projected onto target positioning sheets. Second, a standard MV-CBCT was acquired, using skull based registration with the treatment planning CT and millimeter precision correction using the motorized treatment couch. For the third, a micro-adjustment of the head frame position using a Vernier scale was used to apply the MV-CBCT correction with a 0.1 mm accuracy. After localization with each method was achieved, a series of 1.0 x 1.0 cm fields from gantry angles 0, 90, 180 and 270 degrees was used to asses target alignment by measuring the BB position relative to the beam central axis. **Results:** The standard localization technique resulted in an average displacement of the BB with respect to the beam central axis of 1.2 ± 0.1 mm. Skull-based localization with MV-CBCT using millimeter precision couch offsets resulted in a displacement of the BB with respect to the beam central axis of 2.3 mm. Localization with MV-CBCT and micro-adjustment resulted in a displacement of the BB with respect to the beam central axis of 1.2 ± 0.2 mm. **Conclusion:** After modifications were applied to the MV-CBCT localization technique, accuracy was as good as the standard approach for head frame cases. When MV-CBCT localization is applied to a frameless case, the anatomy-based alignment eliminates the variability of interfraction patient positioning within the immobilizing mask. **Conflict of Interest:** Research partially funded by Siemens Medical Solutions.