

AbstractID: 9274 Title: CBCT Based Quality Assurance for Frameless Stereotactic Radiotherapy Positioning

Purpose: To provide image based quality assurance procedure to evaluate and eliminate systematic discrepancies between an optical positioning system and Cone Beam CT (CBCT). **Materials/Methods:** An optically-guided positioning system (Varian Medical Systems, Palo Alto, CA) is routinely used to setup and monitor patients undergoing fractionated and hypo-fractionated head and neck treatments at Stanford University. We have typically assessed the accuracy of this positioning with matching of (CBCT) images acquired in treatment position to the patients planning CT scans. When the two positioning systems did not agree, the optical one was re-calibrated via CBCT using a custom made imaging device consisting of the reference fiducial frame mounted to a cube phantom that is used for routine OBI QA. A CT scan of this system was acquired and exported to the Son Array workstation where the registration of the CT was performed. Phantom positioning was achieved using optical guidance. Setup was verified by volumetric matching of CBCT images to the CT. **Results:** To date, three patients have been treated in our clinic using the combined frameless array/CBCT positioning systems. In two cases, the solutions of the frameless and CBCT systems coincided within <1 mm and $<1^\circ$ rotations. In one case, differences of 3 mm were observed. The application of the above QA procedure ruled out systematic discrepancies related to system performance. It was concluded that for this patient the bite block positioning varied significantly between planning and setup. In this case positioning of the patient was based on volumetric anatomical matching via CBCT. **Conclusion:** The use of CBCT for both positioning and verification provides an ideal quality assurance procedure for frameless patient setup as it permits calibration of the frameless array and direct visualization of the proposed re-positioning shifts.