AbstractID: 5414 Title: Feasibility of tracking head position under an obscuring immobilization mask using a bite block and a 3-D surface imaging system

Purpose: To assess the accuracy and feasibility of measuring head motion under a thermoplastic immobilization mask when using a 3-D surface imaging system.

Materials and Methods: Small dome-shaped objects were arranged asymmetrically on a styrofoam platform that was attached to a bite block system. The assembly was mounted on the couch of a linear accelerator to a micromanipulator with slow motion controls. This arrangement is operationally similar to a bite block affixed to the maxilla of a intracranial radiation therapy patient. The micromanipulator allowed for motions with six degrees of freedom. We were able to achieve sub-millimeter translational adjustments of the bite block assembly and angulation. The platform and objects were "tracked" with the AlignRT® 3-D surface imaging system (VisionRT, London, UK) in order to compare mechanical translational and rotational movements of known magnitude with the changes reported by the AlignRT system. While translational motions are only reported with millimeter resolution on the computer control screen, we obtained the system records sub-millimeter from stored data file records.

Results: Translational agreement between the micromanipulator and the AlignRT system was 0.1±0.1 mm in all three axes. Rotational agreement was within 0.5 degrees for pitch and roll. Agreement for yaw was not determined, however the display for couch rotation is 0.1 degree and has a stability of ±0.1 degrees.

Conclusion: The AlignRT surface imaging system has superior accuracy that is sufficient for stereotactic radiosurgery guidance using a bite block as we have designed the experiment. Combining a bite block similar to what we designed with the AlignRT 3-D system shows promise in monitoring head position under an occluding immobilization mask.