AbstractID: 9363 Title: Phantom Study of Evaluating the Geometrical Accuracy of Stereotactic Radiosurgery Sysetm Using CBCT and AlignRT^{TM}

Purpose: CBCT and AlignRT are used as secondary imaging devices to setup a phantom with a couch-mount stereotactic system. The geometrical accuracy of the radiosurgery system is investigated with EPID and house-made phantom. **Method and Materials**: Leksell frame with a couch-mounted setup devices are used to setup a house-made phantom with 3 unknown targets. Philipse largebore CT scanner and ADAC Pinnacle planning computer are used to delineate the target and isocenters are determined. The phantom with water is initially setup by using the laser and then, CBCT is applied to apply table correction. Its movemenst are monitored with AlignRT system. The differences between the table correction from Elekta CBCT system and independent AlignRT are reviewed and found to be +/- 0.02mm. The tertiary cone is attached and portal images are taken for various Gantry/Table angles (according to AAPM 54 Reports). The water is removed without changing its position in order to get higher contrast images of the targets in EPID.. Tertiary cones are attached and portal images are taken to determine the geometrical uncertainties. The image are exported to house-made software to analyze the setup uncertainties with ½ pixel accuracy (one pixel = 0.25mm). **Results**: The geometrical uncertainties of the a couch-mount radiosurgery system was estimated by determine the offset between two centers of circles (from cone and target). A house-made software deterrines its offset over different gantry and table angles (according to AAPM 54 Report). The maximum offset was found to be 0.8mm and average offsets are 0.5mm +/- 0.25mm. The dosimetric effects due to the geometrical uncertainties are +/- 0.5mm +/- 0.5mm in three major axis. **Conclusion**: The phantom is very effective to estimate the geometrical uncertainty of the radiosurgery system and it will be used as monthly QA as well as before-treatment QA devices.