

AbstractID: 11270 Title: Localization accuracy of a gantry-mounted radioactive tracking system in the clinical radiation therapy environment

Purpose: The submillimeter accuracy of a novel gantry-mounted radioactive fiducial tracking system has been reported previously in a number of semi-clinical scenarios. These have included tissue equivalent phantoms without bones, and anatomical phantoms including bones, but with measurements being made from a single gantry angle that does not include potential interference from the bones and the patient couch and potential tracking system alignment inaccuracy due to gantry and collimator rotation. In this study the gantry-mounted tracking system is tested in a more realistic clinical scenario. This study used an anatomical phantom with bones placed at multiple positions about the isocenter and made localization measurements with the gantry and collimator at various angles.

Method and Materials: The tracking device was installed on a Varian Trilogy® linac gantry. The radioactive marker was located at the approximate position of the prostate in an anatomical tissue equivalent phantom on the patient couch. Actual marker location was measured using a Microscribe MLX coordinate measuring machine (CMM) arm (certified spatial accuracy of 0.08 mm). The marker was attached to the tip of the CMM arm, which was inserted into a hole in the phantom, and its location was measured simultaneously by the CMM and the tracking system. 102 localization accuracy measurements were made at locations covering a 10cm diameter sphere centered at the linac iso-center with varying gantry and collimator angles including those that would potentially induce interference due to bones and the patient couch.

Results: The mean localization error for all measured positions and gantry and collimator angles was less than 1mm.

Conclusion: The gantry-mounted radioactive tracking system maintains sufficient accuracy for radiation therapy patient localization and monitoring in a real clinical environment even in the presence of bones and patient couch interference.

Conflict of Interest: Research sponsored by Navotek Medical Ltd.