

AbstractID: 11257 Title: Robustness of a gantry-mounted radioactive tracking system in a clinical radiation therapy environment

Purpose: To examine the robustness of a gantry mounted radioactive tracking system in 6MV and 10MV clinical radiation therapy environments. **Method and Materials:** The gantry-mounted tracking system was installed in several radiation therapy treatment rooms. Total dose equivalent to 20 treatment sessions was delivered at 6MV or 10MV in a few fractions (within 1 hour) to a phantom containing a radioactive marker (Ir192). During irradiation the tracking system was operating and system parameters were recorded before, during and immediately after irradiation. Recorded data was analyzed to assess system performance and the accumulated effects of radiation on the system. The radioactive marker location measured by the tracking system was monitored during and after irradiation to test for accuracy and stability. The spectra of the signals from the radioactive marker before and after irradiation were compared to see if any shift in spectrum is observed. After 10MV irradiation, background signal level was monitored to analyze the half-lives of the isotopes resulting from neutron activation. **Results:** There was no significant change in signal spectrum after irradiation and no cumulative influence on system performance was observed. Tracking is temporarily interrupted during 10MV irradiation and is resumed within a few seconds after irradiation despite the increased background noise resulting from neutron activation which decays with a half life of approximately 105 seconds. At 6MV, the system maintains tracking accuracy and performance throughout irradiation despite an increased background noise level. The system adjusts to the changes in background noise level at the beginning and end of irradiation in under 3 seconds. **Conclusion:** The radioactive tracking system is robust in the radiation environment. There is no observable effect or malfunction after exposure to radiation. The system is capable of tracking a radioactive marker during irradiation at 6MV. **Conflict of Interest:** Research sponsored by Navotek Medical Ltd.