

AbstractID: 8869 Title: Initial assessment of peripheral dose for image guided radiation therapy (IGRT) using cone beam CT

Purpose: With the growing use of intensity modulated radiation therapy (IMRT) combined with daily kilovoltage cone beam CT (CBCT) for image guided radiation therapy (IGRT) patient alignment, concerns are growing over the additional (typically unaccounted) dose outside the irradiated volume associated with the overall procedure. Published data exists for both the in-field and organ specific doses that arise from IGRT. Additionally the peripheral dose associated with IMRT has been documented. This present study is intended to add to the data available on peripheral dose; particularly comparing IMRT and imaging dose for patient positioning with CBCT using an Elekta Synergy platform.

Method and Materials: Measurements of both the in field and peripheral imaging doses were made in an anthropomorphic, solid water phantom where “thin” and “fat” patients were simulated with TLD detectors. These were then compared with peripheral dose measurements for typical prostate and head & neck IMRT treatments with MOSFET detectors.

Results: The IGRT dose in the imaged volume correlates well with published data, with 3 – 7 cGy being measured depending on the phantom configuration. The peripheral imaging dose measured was found to be approximately half the amount associated with a typical prostate IMRT treatment at a given point outside the field; with 0.2cGy and 0.4cGy being measured 25cm from the central axis. Thus, a typical patient receiving daily IMRT and IGRT for a fractionated course of radiation therapy for prostate cancer the total peripheral dose would be of the order of 0.2 – 0.5Gy.

Conclusion: This study showed that an appreciable dose is delivered outside the field when daily CBCT IGRT is utilized. These doses should be taken into account when a patient image is requested, as all doses, above the prescription, require justification.