AbstractID: 5078 Title: Dose guidance in radio therapy by means of entrance dosimetry

Purpose: Recently, we introduced a novel hardware design for an image and dose guidance in radiation therapy. An in-line cone-beam CT was integrated on a Siemens linear accelerator providing a radiographic localisation of bone and soft-tissue targets and an on-line in vivo 3D reconstruction of delivered dose. In this presentation we focus on the aspect of dose guidance. We will present a new developed method of 3D in vivo dosimetry and the first clinical results.

Method and Materials: A flat-panel detector RIDXXX (Perkin Elmer) is mounted at the Linac head, in front of the patient. The flat-panel was calibrated against a film measurement to consider off-axis variations of the photon spectrum. Images of each therapy beam were recorded by the flat-panel during beam delivery and beside dark correction each measured image was de-convoluted using an empirically derived scatter kernel resulting in a 2D distribution of the primary photon fluence which is comparable with the TPS fluence. As a final step the measured fluence distribution for each IMRT beam was fed into the TPS in order to reconstruct the delivered dose distribution in 3D. This method of entrance dosimetry was applied to 12 patients.

Results: A generally good agreement of planned and reconstructed dose distribution was also seen for all patients. The error was calculated to be less than +/- 3% for all cases and a very good reproduction of all isodose contours was achieved, with agreement to within +/- 1mm in most places.

Conclusion: A new method of 3D in vivo dosimetry called “Entrance Dosimetry” was developed. This kind of 3D in-vivo dosimetry can be used for an off-line treatment plan verification and for dose guidance by means of an on-line delivered beam verification as well.

Conflict of Interest (only if applicable): This work was partly supported by Siemens OCS