

## AbstractID: 1540 Title: Initial application of 3D gel-dosimetry for the clinical verification of complex dose distributions

A laser-based optical-CT scanner has been developed in our laboratory with the capability for high-resolution 3D dosimetry. Basic characterization of this scanner, presented previously, showed that 3D dose mapping with accuracy  $\geq 96\%$  at a spatial resolution of  $1 \text{ mm}^3$  was feasible. Here we present an initial clinical application of the system: verification of a 5-field IMRT prostate patient delivery. The patient plan (beams, segments, MU, etc.) was copied and recalculated onto the CT dataset of a 3 L gel-dosimeter with cylindrical dimensions of 17 cm diameter and 12 cm height. The IMRT plan was delivered to the gel-dosimeter and optically scanned 48 hours post-irradiation with in-plane resolution of  $1 \text{ mm}^2$  and axial resolution of 3 mm. Corrections were applied to the optical-CT projections to minimize the corrupting effects of laser reflection. Five fiducial marks placed on the phantom enabled precise registration between the measured and planned dose distributions. Dosimetric evaluation was performed using dedicated, 3D dosimetry verification software, DOSEQA, incorporating profiles and maps of distance-to-agreement, dose difference, and the gamma parameter. The relative merits of these analyses with regard to clinical evaluation will be discussed. Close agreement between measured and planned distributions was observed in high dose regions ( $>50\%$  isodose line). At lower doses, the measured dose exceeded the planning dose by up to 15% of  $D_{\text{max}}$ . The cause of this is under investigation. Recommendations based on this experience with the clinical application of gel-dosimetry will be reviewed.