

AbstractID: 4487 Title: Validation of a Plan-based calibration method for relative dosimetry of IMRT

**Purpose:** Validation of a new “plan-based” image calibration method for IMRT relative dosimetry comparisons.

**Method and Materials:** Radiological Imaging Technology image analysis software (version 4.2) contains a new calibration routine called plan-based calibration (patent pending). After registration of a 2-D dose image from the planning system with a measured but uncalibrated dose image, the routine then maps the planning system doses to each film or CR image pixel value and constructs a calibration curve. This calibration curve is then applied throughout measurement image to convert all pixels to dose. Because it does not use an independent dose vs. pixel calibration, it can be used for relative dosimetry only. Ten IMRT cases were studied for which both conventional dose calibration using parallel irradiation of film and the plan-based calibration were used. The Gamma value was used as a measure of agreement where 3% dose and 3 mm distance to agreement were set as tolerances. For these same cases, a 5 mm registration error was introduced and the comparison repeated.

**Results:** In all properly registered cases, the plan-based calibration had fewer pixels with Gamma >1 than did the conventional calibration. Overall, the plan-based method gave 50% fewer pixels with Gamma > 1 than did the film-based calibration. This may be due to additional errors of the film calibration process convolving with intrinsic planning system, phantom setup, and film processing and scanning errors. The plan-based calibration was equally able to detect the registration error by giving a similarly large increase in percentage of pixels with Gamma >1.

**Conclusion:** These data suggest that the plan-based calibration method provides a more accurate comparison of the measured vs. calculated dose distribution than conventional calibration methods using less time and materials.

**Conflict of Interest (only if applicable):** This research was supported by Radiological Imaging Technology.