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Abstract

# Standardized Analysis for interpreting In-Vivo EPID Dosimetry

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## Abstract

Objectives: EPID in-vivo dosimetry data yields an abundance of information, but it is far too cumbersome to customize analysis for each patient's unique treatment plan. In our study, we evaluate if applying universal metrics to in-vivo EPID dosimetry data to detect radiation delivery errors using Sun Nuclear PerFRACTION 3D EPID dosimetry software is as efficient as customized analysis.

Methods: Phillips Pinnacle treatment planning software (TPS) was used to create VMAT plans based on simulation CT scans for 69 patients (19 brain and 50 head/neck). Patients were set up and treated on an Elekta Synergy linear accelerator with CBCT image guidance. PerFRACTION software was used to measure 2D fluence at the EPID for each fraction and back-project a 3D dose onto CT image. Dose delivered to all PTVs and critical organs were compared to planned dose using pre-defined Universal Metrics, known as "Good", "Better", and "Best", and to a customized dose analysis.

Results: An approximate two-fold increase of alerts was observed over the treatment course when tightening the dose metrics from "Good" to "Better", and again from "Better" to "Best". The use of universal metric successfully flags large treatment deviations, while reducing the time needed to design patient-specific template metrics by about 10 min/patient.

Conclusion: This work demonstrates the ability use universal metrics to reduce error fatigue and improve efficiency of monitoring a large number of patients using a commercial EPID in-vivo dosimetry platform.

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