**Towards Reference Dosimetry of MR-Linacs Using a Clinical Probe-Format Calorimeter**

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**Presentations**

**TH-CD-BRA-10 (Thursday, August 4, 2016) 10:00 AM - 12:00 PM Room: Ballroom A**

Purpose: To evaluate the influence of a 1.5 T magnetic field (B-field) on the response of a small-scale graphite calorimeter probe (GPC) developed for use as a novel clinical reference dosimeter. Characterization of the GPC was also assessed in a hybrid MRI-linac (MRL) clinical prototype by performing absolute dosimetry in multiple detector orientations.

Methods: B-field influence was characterized using a variable-strength electromagnet system located 280 cm from the source of a clinical linac. The GPC was used to perform a total of 160 absolute dose measurements (6 MV, 920 MU/min) in a water phantom placed between the poles of the electromagnet. The magnitude of the B-field between the poles was varied in the range of 0 - 1.5 T. The relative response of the GPC was determined and compared to that of a thimble type ionization chamber (Exradin A1SL, Standard Imaging).
Next, 65 dose measurements were performed using the GPC in a clinical MRL field (7 MV, 620 MU/min) to quantify the rotational dependence of the detector in the presence of a 1.5 T B-field. The GPC was rotated in steps of 90° inside a graphite phantom (SSD 140 cm, depth 2.5 cm) for two detector orientations (parallel and perpendicular to the B field).

Results: Relative to the zero B-field condition, the A1SL chamber exhibited an average overresponse of +1.2 % ± 0.03 % at a B-field of 1.5 T, while the GPC under-responded on average by -0.5 % ± 0.9 %. For the MRL measurements, no significant differences were observed between the parallel and perpendicular orientations. In both cases, a rotational dependence of approximately ±1 % was measured.

Conclusion: This work suggests that the B-field has minimal influence on the response of the GPC, making it a potentially attractive solution for clinical MRL reference dosimetry.

Funding Support, Disclosures, and Conflict of Interest: This work has been supported in part by the CREATE Medical Physics Research Training Network NSERC grant RGPIN 432290, as well as NSERC grants RGPIN 298191 & 435608. JR is a scholar from The Terry Fox Foundation Strategic Training Initiative for Excellence in Radiation Research for the 21st Century (EIRR21).