AbstractID: 9257 Title: Evaluation of a novel 4D in-vivo dosimeter

Purpose: To present the latest quality assurance and characterization tests of the RADPOS 4-D *in vivo* dosimetry system.

Method and Materials: The dosimetric evaluation of this system included the measurement of in-air dose profiles in ^{60}Co, 6 MV, and 18 MV beams, and the investigation of the dependence of detector response on beam angle and field size. The stability and accuracy of the positioning component of the RADPOS detector was studied as well as the effect of metals and other commonly used materials on the RADPOS signal.

Results: The dose profiles measured with the RADPOS detector and the diode agreed in within 0.41%, 0.53%, and 2.69% for the ^{60}Co, 6 MV, and 18 MV beams, respectively. The angular response of the RADPOS probe over 360^0 was isotropic within 1.6% (1SD). Over a period of seventy minutes, the position of the RADPOS was read every 30 s and found stable within 0.37 mm. The system can also measure the displacement of a RADPOS detector with an accuracy of (0.45 ± 0.07) mm and (0.75 ± 0.07) mm for step sizes up to 50 mm and 200 mm respectively. The only materials that caused significant interference with the RADPOS signal were aluminum, brass, steel and lead. However, once the separation between the detector and the sample was >100 mm, the interference was minimal (the average deviation was less than 1.00 mm for all samples and sizes).

Conclusion:

Results of the preliminary tests indicate that the device can be used for in-vivo dosimetry in ^{60}Co and high-energy beams from linear accelerators. Future work will involve technical improvements to the device, experiments in a 4D phantom and finally patient in-vivo dosimetry.

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