

AbstractID: 13389 Title: Dosimetric Evaluation and Characterization of a microLion Liquid Ionization Chamber

Purpose: To evaluate the dosimetric characteristics of the microLion liquid ionization chamber. Evaluation criteria were dose rate dependence, energy and angular dependence, spatial resolution, and suitability for narrow field dosimetry.

Method and Materials: Measurements were performed using a Varian 2300 C/D linear accelerator (Varian Medical System, Inc., Palo Alto CA). The microLion ionization chamber (PTW Freiburg, Germany) has a sensitive volume of 0.002cm^3 with the centroid located at 0.975 mm from the entrance window. The spatial resolution, dose rate and energy dependence measurements were performed using the BluePhantom from Scanditronix-Wellhofer (IBA, Memphis TN). A calibrated Unidos^{webline} electrometer (PTW Freiburg, Germany) was used to measure the charge and current. An external high voltage supply (PTW Freiburg, Germany) was used to provide the recommended bias voltage of 800V. Angular dependence was measured using a solid water phantom.

Results: Dose rate analysis showed differences of $<1.5\%$. Electron energy dependence showed differences of up to 3.0%. Output factors for field sizes smaller than $3.0 \times 3.0\text{cm}^2$ showed differences when compared to a Semiflex detector. Small differences ($<1.0\%$) in response due to angular dependence were observed. However, a 7.0% difference in response was noted when the detector was irradiated parallel, as opposed to perpendicular, to the beam direction. The microLion detector exhibited a sharper fall off in the penumbra region as well as a larger shoulder when compared to a Semiflex detector. Good reproducibility was demonstrated in percent depth dose curves.

Conclusion: The dosimetric evaluation of the microLion detector, a liquid ionization chamber, showed that the detector demonstrates good relative and absolute dosimetry characteristics. When operated at 800V bias, the detector shows good signal response in addition to good stability. The extremely small sensitive volume allows the microLion to be used for small field dosimetry.