AbstractID: 8769 Title: Liquid Scintillators for 2D Photon Dosimetry

Purpose: Liquid scintillators have the potential of providing real-time dosimetric information in 2D and even possibly in 3D. The purpose of this work is to study the performance of a liquid scintillator (LS) detector system for photon beam dosimetry.

Method and Materials: The detector system consisted of a lucite tank ($7\times7\times16$ cm^3), a camera objective and a cooled CCD type camera (Luca, Andor Technology, South Windsor, CT), which was shifted by 59 cm with respect to the center of the tank. The LS material BC-531 (Saint-Gobain, Newbury, OH) was used. The detector system was irradiated with 6-MV photons on a Varian Clinac 21EX under standard conditions. Different field sizes, dose rates and camera light enhancement modes were measured and compared to the dose profiles of the treatment machine.

Results: The light signal produced by the LS was slightly distorted by light scattering isotropically within the liquid and refraction at the tank interface. Taking into account this blurring we could reproduce the dose distribution. The LS material is nearly water equivalent. The detector system was also found to be dose rate independent. Using the electron magnification mode of the CCD camera we were also capable of measuring very low dose rates from an I-125 seed.

Conclusion: The present detector system is suitable for measuring 2D dose distributions under the conditions used in therapeutic photon treatments. Further investigations are underway to fully characterize this system to make it practical for routine clinical use.

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