AbstractID: 11790 Title: Evaluation of the Accuracy, and Energy Dependence of the Nano-dot Dosimeters

Purpose: Characteristics and clinical application of the diode, TLD, and Nano-dot have been studied by various investigators. However, there is a limited publication on clinical application of the Nano-dot detectors (Landauer®)[1]. Despite the detailed investigations on characteristics of Nano-dot, such as time, temperature, and depth, there is no data on energy dependence and accuracy of this dosimeter. The goal of this project is to evaluate the accuracy, energy dependence, and also positional dependence of the Nano-dots in their clinical applications.
Material and method: Accuracy and energy dependence of the Nano-dot response have been investigated using the megavoltage photon and electron beams from Varian Clinac 2100/EX2 Linear Accelerator. The irradiated in tissue equivalent phantom material were read using a MircoStar reader. The responses of the Nano-dots were converted to absorbed dose by calibrating the reader using a set of calibrated Nano-dots which were irradiated in the calibration condition for doses ranging from 0.0 to 400 cGy. The measured absorbed doses for other irradiated Nano-dots were analyzed as a function of beam energy and dose.

Results: The results of these investigations show that the response of the Nano-dots are very reproduceable (<0.2%). However, up to 5% variation among different Nano-dots exposed to the same dose and the same beam energy has been observed. These dosimeters are less sensitive to higher energy photon beams. Accurate localization of the Nano-dots on the patient is a significant factor on clinical application of this detector.

Conclusion: Nano-dots must be carefully calibrated for the different beam energy. Therefore, using the same calibration factors on the MicroStar reader, one has to verify that the results to be corrected appropriately, if it is used for other beam energies.

1. Paul A. Jursinic, “Characterization of optically stimulated luminescent dosimeters, OSLDs, for clinical dosimetric measurements, Med. Phys. 34 (12) 4594-4604 (2007).