AbstractID: 8984 Title: In-Vivo Dosimetry Using Aluminum Oxide Detectors

Purpose: The purpose of this study was to determine if aluminum oxide (Al_2O_3) detectors could be used for in-vivo dosimetery. The first specific aim of this project was to characterize the performance of a commercially available aluminum oxide detector system for in-vivo dosimetry. The second specific aim of this study was to compare the accuracy of the new aluminum oxide detector to a commercially available MOSFET system in side-by-side patient measurements.

Method and Materials: The dosimeters were evaluated for: 1) Signal decay; 2) Field size dependence; 3) Energy dependence; 4) Angular dependence; and 5) their reusability using the Landauer, InLight MicroStar system. In-Vivo dosimetry measurements were taken for 53 patients treated on a Varian 21EX using (Al_2O_3) dosimeters and 67 patients using OneDose Mosfets.

Results: The variation between dosimeters was evaluated and found to be ±1.6%. The dosimeters appeared to over-respond in the first 10 minutes, however, after 10 minutes the chips were within 1 percent of the steady-state reading. Unlike other detectors, the Al_2O_3 dosimeters showed no field size, energy, or angular dependence. In testing the Al_2O_3 reusability, it was found that the half life of the OSL material was 5.14 ± 0.01 hours. The agreement between the dosimeters and the calculated doses for the in-vivo dosimetry patients was -1.9±5.9%. The OneDose agreement between mosfet and calculated dose was found to be -1.3±8.5%.

Conclusion: Al_2O_3 dosimeters can be a convenient, inexpensive alternative to TLDs, MOSFETS, and Diodes. The agreement between calculated and measured doses for in-vivo dosimetry QA is comparable to TLDs, MOSFETS, and Diodes. The dosimeters can be quickly read and analyzed after 10 minutes (*to allow time for signal decay*). The dosimeters do not appear to have an energy, field size, angular, or sensitivity dependence. In addition, under specific conditions, the detectors can be erased and re-used.