

AbstractID: 9245 Title: An Evaluation of a Solid State Dosimeter in Direct Measurement of CT Dose

**PURPOSE:** Our group presented in the past the results of pediatric CT dose monitoring using a small volume solid state dosimeter (SD). This paper studies the responses of such a dosimeter with various technique settings and the limitations implied.

**METHODS & MATERIALS:** A variety of phantoms has been involved, including anthropomorphic adult head, chest and abdomen phantoms as well as pediatric head and body phantoms. In addition, cylindrical acrylic phantoms are utilized with varying diameters from 6 cm to 32 cm. A pediatric 64 slice VCT scanner is utilized in this study. We evaluate the angle and energy dependence of the SD dosimeter and the effect on dose measurement.

**RESULTS:** The results measured with the SD dosimeter are compared to the CTDI measurements by a pencil ion chamber (IC). The SD energy response is within +/- 10%. It is angle dependent which affects CT dose measurement. It is shown that the IC results are higher than those of SD. The discrepancy increases with kVp, e.g., 20% at 80 kVp, 36% at 100 kVp, 49% at 120 kVp and 61% at 140 kVp using a 16 cm diameter phantom. In addition, the variation appears to be more significant as the phantom size reduces, e.g., 12% at 120 kVp for a 32 cm diameter phantom, 39% for 24 cm, 49% for 16 cm and 77% for 10 cm. Similar trends are observed with anthropomorphic phantoms. This leads us to adjust the setting and use the SD sensors in pair with one facing up and the other facing down. Corrective factors are calculated to compensate for the angle dependence.

**Conclusion:** The angular sensitivity in the SD dosimeter affects the ultimate dose reading and needs correction factors. Overall, the SD dosimeter provides a new tool for direct and instantaneous measurement of CT dose.