

Pediatric CT dosimetry using a newly designed radiophotoluminescence glass dosimeter

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Introduction: The radiophotoluminescence glass dosimeter (RGD-352M, Dose Ace GD-300 series) has been used to measure dose in the radiation diagnostic field. However, large angular dependence makes CT dosimetry using RGD become difficult. Recently, an additional filter for RGD has been proposed to improve angular dependence. In this study, we proposed a methodology to measure the organ dose in a 5-year-old anthropomorphic phantom by a newly developed RGD dosimetry system and compared it with a web-based CT dose calculator. **Material and methods:** In this work, RGDs were individually calibrated with the ISOVOLT TITAN-320 x-ray generator (GE Inspection Technologies). All the experimental measurements for this study were performed using a CT scanner (SOMATOM Definition Flash, Siemens AG, Forchheim, Germany). Dose by *i*th RGD was then obtained by $D_i = M_{iRGD} \times N_i \times (\mu_{en}/\rho)_{m,air}$, where M_{iRGD} was converted into absorbed dose for the corresponding organ using dose conversion factor N_i and the ratio of mass energy absorption coefficient between the material of corresponding organ *m* and air $(\mu_{en}/\rho)_{m,air}$. Figure 1 shows the 5-year-old anthropomorphic phantom (ATOM Model 705-D; CIRS, Inc., USA) and the CT scanner used in this work. **Results:** Figure 2 shows the patient-specific organ dose as measured by RGD, and organ dose calculated by WAZA-ARI. The calculation results from WAZA-ARI were relatively lower than the measured results with a range of 8 – 20 % which corresponds to the dose difference caused by the difference in effective diameter.



Figure 1 the phantom and the CT scanner used in this work.

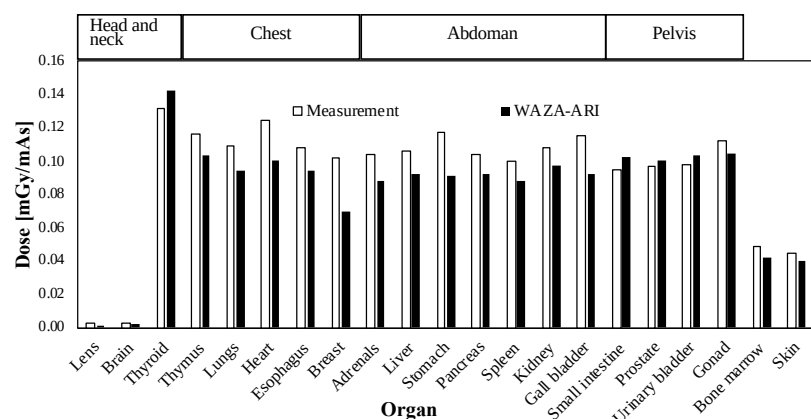


Figure 2 Bar graphs of organ doses obtained from WAZA-ARI (black) and RGDs dosimetry system (white).