

**Purpose:** When tube current modulation (TCM) scanning is performed over multiple anatomic regions (e.g. abdomen/pelvis), typically only the average CTDIvol over all regions is reported. The purpose of this work was to compare simulated organ doses from tube current modulated scans with different CTDIvol values (including a region specific CTDIvol) and to investigate the feasibility of estimating organ doses using CTDIvol and patient size.

**Methods:** Voxelized models with contoured abdominal organs (liver, spleen and kidneys) were created using 40 abdomen/pelvis scans with tube current modulation (Care Dose4D) acquired on a Siemens Sensation 64. Dose to these organs were estimated using Monte Carlo methods that simulate actual scans. Simulated organ doses were compared with three CTDIvol values: CTDIvol reported on the scanner (CTDIvol,Abd/Pel), CTDIvol based on average effective mAs of abdomen region of the scan (CTDIvol,Abd), and CTDIvol based on average effective mAs from images containing the organ (e.g. CTDIvol,Liver). Organ doses were normalized by each CTDIvol and the relationship between each of these ratios and patient perimeter was investigated. These results were also compared to organ doses normalized by CTDIvol for 32cm CTDI phantom for fixed tube current.

**Results:** This study showed that CTDIvol based on the entire exam underestimates organ dose by up to 33%. This percentage increased to 43% and 38% for CTDIvol,Abd and CTDIvol,Liver, respectively. However, organ doses normalized by CTDIvol,Abd and CTDIvol,Liver showed a strong linear correlation with patient perimeter. Similar linear correlation was observed for fixed tube current results.

**Conclusions:** When using TCM, the CTDIvol reported is over the entire scan which does not correlate well with actual patient dose. However, specific region-CTDIvol-normalized organ doses showed strong correlation with patient size and therefore can be used to estimate organ doses from a TCM scan using patient perimeter and region specific CTDIvol.