

AbstractID: 13511 Title: Estimating dose to eye lens and skin from radiation dose from CT Brain Perfusion examinations: Comparison to CTDIvol values

Purpose: In brain perfusion studies, the patient's head is scanned repeatedly at one location over a short period of time to monitor contrast wash in and wash out. This may result in high radiation doses to the skin and the eye lens and possibly deterministic effects. The purpose of this study is to estimate the radiation dose to skin and eye lens from brain perfusion studies under a variety of scanning conditions and to compare these to CTDIvol. **Method and Materials:** Skin dose and eye lens dose were estimated using Monte Carlo simulations with a detailed patient model (GSF Model Irene) and CT source models. Brain perfusion scans were simulated with axial scans using the widest available collimation at various scan locations. For each available kVp, the total mAs (mAs/rotation x number of rotations) to reach 2 Gy for eye lens and for skin was determined. Meanwhile, CTDIvol under each condition was obtained to investigate how well it predicts these doses. **Results:** For all kVps at four different scanners, the total number of rotations that would cause the dose to eye lens and skin reach 2Gy were calculated. For example, for a 300 mAs/rotation scan at 120kVp for scanner B, 58 rotations would result in an eye lens dose of 2Gy, and 47 rotations would result in a maximum skin dose of 2Gy. Depending on different kVp, CT scanners, and scan location, CTDIvol overestimates the eye lens dose by 46% to 18500% and it overestimates the skin dose by 25% to 82%. **Conclusion:** This study provides detailed information about the radiation dose to eye lens and skin from CT brain perfusion examinations. CTDIvol reported on the scanner console generally overestimates the dose to eye lens and skin. The results could help to improve the design of CT scan protocols.