

AbstractID: 13679 Title: Image quality, organ doses and risks of computed tomography exams in Pernambuco, Brazil

Purpose: This study determined image quality and organ doses for common CT exams in six hospitals of Recife, Pernambuco, in order to assess health risks.

Method and Materials: Data were gathered from six helical CT scanners, one of them with 64 slices. Image quality was evaluated using the ACR accreditation phantom and protocol. Scan acquisition parameters (kV, mAs, scan time, slice thickness, table increment or pitch, scan length) and number of scans per patient were documented for 90 head, 75 chest, 60 abdomen and 60 abdomen/pelvis exams performed using these scanners. Patient age and gender were also recorded. Doses to relevant organs were calculated using the "ImPACT CT Patient Dosimetry Calculator". Stochastic (and for the eye lenses, deterministic) risks were estimated using BEIR and ICRP data.

Results: Only two scanners met all the ACR quality criteria. Two failed the spatial resolution test and two, the low contrast resolution one. The mean doses and [ranges] (in mGy) received by some relevant organs for each CT exam were as follows: Head – Eye lenses: 36 ± 22 [7.9 - 110]. Chest – Breast: 11.8 ± 5.7 [1.7 - 33]; thymus: 18.8 ± 7.6 [9.9 - 48]; heart: 15.2 ± 7.2 [1.7 - 42]; lung: 15.1 ± 7.1 [4.6 - 42]. Abdomen – Stomach: 19 ± 13 [7.4 - 55]; liver: 17 ± 10 [6.7 - 48]. Abdomen/pelvis (34 females, 26 males) – Ovaries: 21 ± 11 [5.4 - 39]; uterus: 23 ± 12 [5.1 - 42]; prostate: 16.0 ± 8.6 [2.9 - 39]; testes: 2.5 ± 2.6 [0.2 - 10]. Doses were unrelated to scanner type and/or image quality. The lowest doses were given by the scanner with the worse performance, suggesting a poor facility operation. Estimated risks and recommendations to optimize protection will be presented and discussed.

Conclusion: Image quality is not adequate in all the hospitals. Dose ranges are wide and in several organs are high; some eye lens doses are near the cataract formation threshold.