

Purpose: To optimize CT protocols for pediatric whole-body PET/CT examination and to evaluate radiation dose.

Methods: We developed pediatric whole-body CT acquisition protocols used for attenuation correction and localization of the PET data. Patients were categorized in 6 groups according to their weight and age, similar to the Broselow–Luten color-coded scale. X-ray tube current modulation was employed in all protocols with maximum mAs ranging from 25 to 55. The acquisition parameters were as follows: 100 kVp; 16x1.25 mm X-ray beam collimation; 27.1 Noise Index; 1.35:1 pitch; 0.5 s rotation time; and 3.75 mm reconstructed slice thickness. For the senior group of 12 – 17 years of age (50 – 70 kg) we used 120 kVp and 50 max mAs. All data were acquired on a GE Discovery STE 16 PET/CT scanner, and patients were injected with 5.55 MBq (0.15 mCi) of 18F-FDG per kg of weight. We surveyed pediatric studies performed in our institution during the period of 2009 – 2010. There were 27 patients from 18 months to 17 years of age, and 12 of them had had multiple exams (up to 6). Overall, 54 pediatric studies were performed over the two-year period. Effective CT dose was calculated using the dose length product (DLP) values from the patients' dose reports and conversion factors (normalized effective dose per DLP), dependant on the patient age.

Results: Effective CT doses were in the range from 0.91 mSv to 3.6 mSv for all patient categories. Comparison with published data based on 11 patient weight categories demonstrated lower dose in each patient group achieved with the acquisition protocols developed in our institution.

Conclusions: Pediatric CT protocols for 6 patient weight/age-based categories were developed for the whole-body PET/CT. Patients' dose survey demonstrated lower effective CT dose than reported in the literature for each weight category.