

Purpose:

To retrospectively compare different topogram-based patient body size indices and to determine if attenuation-area product (AAP) is more accurate as a basis for optimizing scan protocol and minimizing patient dose in body CT of adults.

Methods:

Thirty-seven non-contrast CT scans of thorax or abdomen exam were studied retrospectively, with patient age ranges from 21 to 67 years old. The individual patient body attenuation of the scanned region was computed from reconstructed images as the gold standard, after first converting image pixel values from HU values to μ values (μ is the attenuation coefficient and a is the area per pixel). Four topogram-based body size indices (diameter (D), girth (G), projection area (sqrtPA), and AAP) were computed and compared to the gold standard using regression analysis. D was calculated by averaging the coronal and sagittal diameters, G by modeling the patient cross-section as an ellipsoid, sqrtPA as the square root of the summation of the detector channel data. AAP was computed by multiplying the sqrtPA by the area per pixel, after accounting for patient mis-centering, table attenuation, scanner geometry and detector pitch angle. The goodness of fitted linear models in correlation with gold standard was described by 95% confidence intervals (CIs).

Results:

Regression analysis resulted in different linear models. Preliminary results showed diameter and girth were similar in correlation with patient body attenuation with 95% CIs of ± 2.8 cm and 3.1cm. PA was better than both D and G; however, AAP was most accurate with a 95% CI of 1.3cm. At this time, we are analyzing more patient data sets.

Conclusions:

AAP may potentially be an automated, accurate patient size index as a basis for protocol optimization and dose minimization in adult body CT. Patient mis-centering and pixel area corrections are critical for accurately estimating patient body size from topograms.