

Purpose: To determine air KERMA (K_a) at the scalp, orbit, and thyroid in patients undergoing a stroke imaging protocol that includes CT cerebral perfusion, pre- and post-contrast head CT, and CT angiography scans.

Method and Materials: IRB exemption was obtained to retrospectively review patient dosimetry information for 81 patients who were imaged under a stroke imaging protocol. Patients had OSL dosimeter chips placed on the head above the ear, at the lateral canthus, and approximately one inch above the sternal notch to measure K_a at the scalp, eye lens, and thyroid, respectively. To account for the different response of the chips exposed at both 80 and 120 kVp, experiments were performed to determine a correction factor to apply to the OSL K_a values, which were all read using a 120 kVp calibration.

Results: A 5.5% reduction was used to correct the measured K_a . K_a at the thyroid ranged from 1.8 to 92.6 mGy, with a mean of 13.6 mGy and standard deviation of 18.3 mGy. K_a at the canthus was 22.7 to 393.3 mGy with mean of 185.8 mGy and standard deviation of 61.4 mGy. K_a at the scalp showed a bi-modal distribution, as patients receiving Diamox therapy received two CT perfusion scans. Overall mean was 289 mGy, with peaks at 190 and 380 mGy. The range was 67.8 mGy to 575 mGy.

Conclusions: Although the scan parameters (kVp, mA, rotation speed, etc.) show little variation for adult head CT scans, doses to patients undergoing stroke imaging protocols span a large range due to differences in the number of scans in each patient, and to some extent differences in patient size. Doses for a single study were below the threshold for deterministic effects, however for repeat studies the potential exists to exceed thresholds for erythema and epilation.