

Purpose:

To determine and compare the entrance skin doses from the routine CT brain perfusion protocols on various Siemens CT scanners.

Methods:

Four Siemens CT scanners were surveyed using their brain perfusion protocol (see supporting document): two Sensation 64-slice scanners (EC-CT-2 and IP-CT-2), one Definition Dual Source (64-slice), and one Definition Flash (128-slice). The skin dose was measured using a RANDO® anthropomorphic phantom and Landauer optically stimulated luminescent (OSL) nanoDot dosimeters. We performed the scan three times on each scanner with the OSL nanoDots on the surface of the head at the 0, 90, 180, and 270 degree positions. We then averaged the skin doses from the three scans at each of the four positions to calculate an average skin dose for each CT scanner and an average skin dose per scan, independent of position.

Results:

The mean skin doses obtained were $341.7 \text{ mGy} \pm 44.5$ for the Definition Dual Source, $326.7 \text{ mGy} \pm 37.3$ for EC-CT-2 (64 slice), $326.6 \text{ mGy} \pm 55.6$ for IP-CT-2 (64 slice), and $435.6 \text{ mGy} \pm 29.7 \text{ mGy}$ for the Flash CT. The skin doses of the two 64-slice scanners and the Definition dual source CT were similar, as expected, since they employed the same beam width. The skin dose of the Flash CT was 32.8% higher, which as expected, since its beam width is ~33% larger (38.4 mm for the Flash vs. 28.8 mm for the others).

Conclusions:

Based on the phantom study, the skin doses for routine CT brain perfusion protocols on the mentioned scanners are 325-435 mGy, which is far below the dose threshold for possible radiation induced skin damage (2000 mGy).