Purpose:

The purpose of this study was three-fold: 1) to estimate the organ doses and effective dose (ED) for patients undergoing neuro 3D-imaging protocols, 2) to study the effect of beam collimation on ED, and 3) to derive protocol-specific DAP-to-ED conversion factors.

Methods:

A cone-beam CT system (Philips Allura Xper FD20/20) was used to measure the organ doses for seven neuro imaging protocols. Two data sets were obtained: seven protocols with uncollimated beam (FOV: entire head) and four with beam collimation (FOV: roughly from the base to the top of the skull). Measurements were performed on an adult male anthropomorphic phantom (CIRS, Norfolk, VA) with 20 MOSFET detectors (Best Medical Canada, Ottawa, Canada) placed in selected organs. The dose area product (DAP) values were recorded from console. The ED values were computed by multiplying measured organ doses to corresponding ICRP 103 tissue weighting factors.

Results:

For seven protocols with uncollimated setting, the EDs ranged from 0.16 mSv to 1.6 mSv, and the DAP-to-ED conversion factors range from 0.037 to 0.17 mSv/Gy/cm2. For four protocols with beam collimation, the ED was reduced approximately by a factor of 2, and the DAP-to-ED conversion factors by approximately 30%.

Conclusions:

We have measured ED for standard adult neuro imaging protocols in a 3-D rotational angiography system. Our results provide a simple means of ED estimation using DAP values from console in the C-arm cone-beam CT system.

Funding Support, Disclosures, and Conflict of Interest:

Research was funded in part by Philips Healthcare, the Netherlands.