

ESTIMATION OF PATIENT EYE LENSES DOSES DURING DIAGNOSTIC CEREBRAL ANGIOGRAPHY

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Introduction: Eye lenses are among the most sensitive organs to x-ray radiation and may be considered at risk during neurointerventional radiology procedures. Recently, the threshold for the deterministic effect for the lens of the eye has been reduced from 5.0Gy to 0.5Gy based on the new epidemiologic evidences. There is few information in the literature regarding the eye lens dose received by patients during neurointerventional radiology procedures. The aim of this work is to estimate the patient lens doses during the the diagnostic cerebral angiography performed in Recife, Brazil.

Material and method: This study was performed in a public hospital, located in Recife and was approved by the Brazilian Research Ethics Commission (CONEP) under the certificate number 26528719.6.0000.5198.

A total of 19 cerebral angiographies in adult patients with ages ranging from 22 to 76 years old were investigated. The procedures were performed on a Siemens Artis Zee Ceiling angiograph, equipped with a flat panel detector. For each procedure, the fluoroscopic time, kerma-area product (P_{KA}), kerma at the refence point ($K_{a,r}$), number of images both for DSA and Cone Beam Computed Tomography (CBCT) and the exposure parameters (peak tube voltage (kVp), tube current (mA), pulse width (ms) and beam filtration) were registered from the DICOM dose report. The radiation dose at the eye lens was estimated by measuring the entrance surface air kerma with $Li_2B_4O_7:Ag,Cu$ thermoluminescent dosimeter, that was previously calibrated in the Metrology Laboratory of Ionizing Radiation- DEN/UFPE. Two dosimeters were encapsulated in a plastic badge and attached to the patient's face: next to the left eye, the glabella and next to the right eye. The TL reader used was a Victoreen model 2800, in step mode and heat rate of $10^0C/s$

Results: The results showed $K_{a,r}$ values ranging from 123 mGy to 981.4 mGy, with a mean value of 388.8 mGy. The results of total air kerma - area product obtained in this study showed that for the angiographic procedures, the mean value is 27.2 Gy.cm², with a range between 5.0 and 65.9 Gy.cm².

Figure 1 shows the distribution of the dose values in the eye region of the patient. The data indicate that the highest doses were received by the left eye with a mean value of 37.9mGy, with the maximum of 102.1. The mean dose value on the right eye was 22.9 mGy and the maximum value, 84.9 mGy.

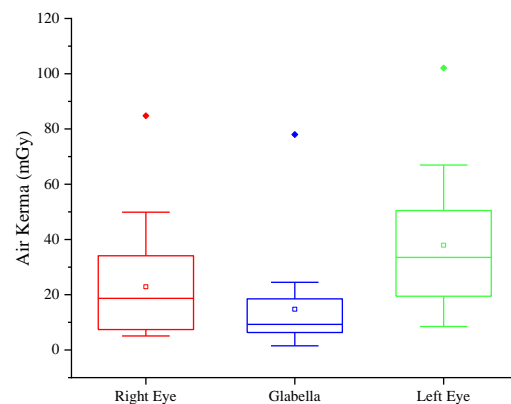


Figure 1. : Distribution of air kerma on the skin surface of the eye region in adult patients undergoing cerebral angiography

Conclusions: The patient eye doses in the cerebral angiography are not negligible and needs to be monitored. The probability of radio-induced lens opacities and cataracts should increase as the patient undergo multiple x-ray procedures throughout life.