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W TORUNIU

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## STRESZCZENIE ROZPRAWY DOKTORSKIEJ

**Dyscyplina naukowa:** Nauki o Zdrowiu

**Tytuł rozprawy doktorskiej w języku angielskim:** Diagnostic quality and radiation safety of carotid and vertebral arteries imaging by computed tomography in author-developed low-dose protocols.

### 1. Streszczenie w języku angielskim

**INTRODUCTION:** The number of performed angiography procedures in computed tomography (angio-CT) is steadily increasing. Imaging of the carotid and vertebral arteries for the diagnosis of vascular pathologies and stroke assessment is essential. Considering that computed tomography (CT) has the largest, approximately 70%, contribution to the effective dose per average inhabitant in Poland, it is important to minimize radiation exposure during these examinations. One of the methods of radiological protection for patients undergoing CT examinations is optimizing examination protocols. Changing the physical exposure parameters is the most cost-effective and well-known way to improve the radiation safety of patients during CT imaging.

**AIM:** The main objective of the study was to compare the diagnostic quality and radiation doses of author-developed low-dose protocols with the standard protocol in CT angiography of the carotid and vertebral arteries.

**MATERIALS AND METHODS:** To this randomized, double blind study 150 patients referred for carotid and vertebral artery angiography using computed tomography (angio-CT) were included. Through random selection, 50 patients each underwent the examination using the standard protocol based on FBP algorithm (Group I), a low-dose protocol with filtered back projection (FBP, Group II), and adaptive statistical iterative reconstruction: ASIR 40% (specific to the General Electric CT scanner, Group III). The diagnostic quality was evaluated by a 3-point Likert scale by 3 physicians (2 radiologists and 1 angiologist).

**RESULTS:** The actual mean radiation dose (DLP) in Group (II) amounted 218, while in group (III) 207 [mGy cm]. These doses were significantly, statistically lower than in a control group (I) 320 [mGy cm]. All examinations were evaluated as diagnostic. The average ratings of the parameters made by the physicians in Group I and Group II did not differ statistically (range from 2.5 to 2.9). However, in the iterative protocol (Group III), the ratings for specific segments (initial segment of the common carotid artery, intracranial segment of the internal carotid artery, and segments V1 and V4 of the vertebral arteries) were statistically significantly higher compared to the other protocols (starting from 2.8 and above).

**CONCLUSIONS:** Compared to standard protocol (Group I), the radiation doses in the low-dose protocols were reduced by approximately 31% in group (II) and 35% in group (III) without compromising image quality. The ASIR 40% protocol obtained the highest average ratings for image quality in almost all arterial segments with the lowest radiation dose. If the iterative reconstruction method is available on the CT scanner, it should be recommended for imaging of carotid and vertebral arteries.

*Agnieszka Bylińska*.....

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