

Evaluation of Occupational Doses in Interventional Radiology

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Abstract : Interventional Radiology is the radiology modality that provides the highest dose values to medical staff. Recent researches show that personal dosimeters may underestimate dose values in interventional physicians, especially in extremities (hands and feet) and eye lens. The aim of this work was to study radiation exposure levels of medical staff in different interventional radiology procedures and estimate the annual maximum numbers of procedures (AMN) that each physician could perform without exceed the annual limits of dose established by normative. For this purpose LiF:Mg,Ti (TLD-100) dosimeters were positioned in different body regions of the interventional physician (eye lens, thyroid, chest, gonads, hand and foot) above the radiological protection vests as lead apron and thyroid shield. Attenuation values for lead protection vests were based on international guidelines. Based on these data were chosen as 90% attenuation of the lead vests and 60% attenuation of the protective glasses. 25 procedures were evaluated: 10 diagnostics, 10 angioplasty, and 5-aneurysm treatment. The AMN of diagnostic procedures was 641 for the primary interventional radiologist and 930 for the assisting interventional radiologist. For the angioplasty procedures, the AMN for primary interventional radiologist was 445 and for assisting interventional radiologist was 1202. As for the procedures of aneurism treatment, the AMN for the primary interventional radiologist was 113 and for the assisting interventional radiologist were 215. All AMN were limited by the eye lens doses already considering the use of protective glasses. In all categories evaluated, the higher dose values are found in gonads and in the lower regions of professionals, both for the primary interventionist and for the assisting, but the eyes lens dose limits are smaller than these regions. Additional protections as mobile barriers, which can be positioned between the interventionist and the patient, can decrease the exposures in the eye lens, providing a greater protection for the medical staff. The alternation of professionals to perform each type of procedure can reduce the dose values received by them over a period. The analysis of dose profiles proposed in this work showed that personal dosimeters positioned in chest might underestimate dose values in other body parts of the interventional physician, especially in extremities and eye lens. As each body region of the interventionist is subject to different levels of exposure, dose distribution in each region provides a better approach to what actions are necessary to ensure the radiological protection of medical staff.

Keywords : interventional radiology, radiation protection, occupationally exposed individual, hemodynamic

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