First Latin-American Congress
on Solid State Dosimetry and Radiation Measurements
13-17 September, 2021

EVALUATION OF RADIATION EXPOSURE IN INTERVENTIONAL RADIOLOGY WITH OSL DOSIMETRY

Abner A. Oliveira[1], Raissa A. C. Guassu[1], Allan F. F. Alves[2], Yvone M. Mascarenhas[3], Maria F. A. Magon[3], Diana R. Pina[2]

[1]Botucatu Biosciences Institute, São Paulo State University, 18618-687, Botucatu, São Paulo, Brazil. (MSc)
[2]Botucatu Medical School, São Paulo State University – UNESP, 18618-687, Botucatu, São Paulo, Brasil
[3]SAPRA LANDAUER Company, 13562-400, São Carlos, São Paulo, Brazil

Introduction: Interventional Radiology (IR) is considered the medical field associated with the highest doses of ionizing radiation to the medical staff. This happens due to the proximity and extended period of exposition. To determine the effective doses received by professionals, Brazil regulations determine the use of dosimeters in the most vulnerable area of the trunk, such as the chest. This approach is efficient in situations of exposure to homogeneous fields of radiation. However, with non-homogeneous radiation fields, there is a possibility that these dosimeters do not accurately describe effective doses. The objective of this work was to evaluate equivalent dose in IR, using Optically Stimulated Luminescence (OSL) dosimeters for the main and secondary interventionists. The following modalities were evaluated: angiography, angioplasty, and treatment of arterial aneurysm.

Material and method: 1 - Selection of procedures: The procedures chosen were those with longer exposure time, frequency of the procedure during the routine, and "noise level" (parameter related to tube current - mA). The procedures chosen were angiography, angioplasty (performed with cardiovascular, neurovascular, and vascular protocols), and treatment of arterial aneurysm (performed with vascular protocol). 2 - Dosimetry of professionals: 2 professionals were monitored per procedure, the main and secondary interventionists. The dosimeters were positioned in 6 distinct body regions according to the degree of radiosensitivity: lens, thyroid, chest, abdomen, hand, and foot. The dosimeter in the lens was the type nanodot, with a central position in the lead eyeglasses. For the other regions, the inlight-type dosimeters were used, being positioned in the side closest to the tube. 3 – Construction of Equivalent Dose (ED) profiles. SAPRA LANDAUER company performed all dosimeters reading and preparation. Therefore, the profiles of equivalent dose were constructed through the accumulated dose by the dosimeter and considering the total amount of time.

Results: Equivalent dose profiles were estimated for angiography (cardiovascular: n =160, neurovascular: n = 31, and vascular: n =14), and angioplasty (cardiovascular: n = 21), where n is the number of procedures. ED of angiography with cardiovascular protocols are presented in Figure 1.

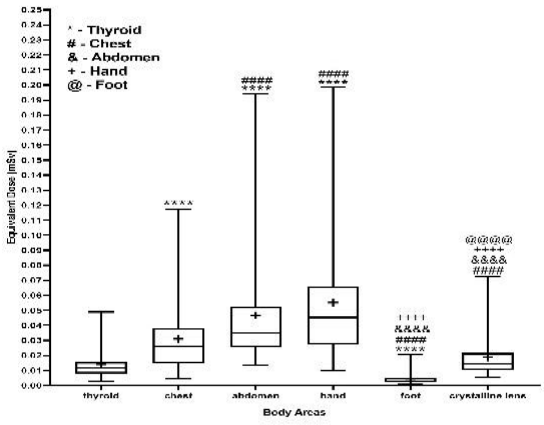

Figure 1 – Dose variation from six regions with dosimeter for the primary interventionist in coronary angiography.*p<0.5,**p<0.1,***p<0.01, ****p<0.001. Other symbols indicate the same statistical difference.

For neurovascular and vascular procedures, the median equivalent dose in the chest for the primary interventional angiography procedure was: 0.042 and 0.013 mSv. For the cardiovascular protocol, the median equivalent dose in angioplasty was 0.049 mSv. Remaining procedures did not present relevant statistics.

Conclusions: We evaluated equivalent dose in six body regions of professionals during interventionist procedures. Through statistical analysis, it was noted that the level of exposure of the chest region is not the best representation for the whole body. Regions such as the abdomen and hand can be underestimated when using the thoracic region as a representative.

alvesabner.oliveira@gmail.com