



OCCUPATIONAL DOSIMETRIC EVALUATION OF EXTREMITIES IN A NUCLEAR MEDICINE SERVICE IN RECIFE - PE

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Introduction: Among the procedures for fractionation of radioactive activity, administration of the radiopharmaceutical and acquisition of patient images, workers at Nuclear Medicine facilities are routinely exposed to ionizing radiation. Dosimetric assessment is necessary to ensure that practices comply with national and international guidelines. Occupational exposures to extremities in nuclear medicine show a wide variation between wrist and ring monitoring. Observing the increasing frequency of procedures, mainly PET and their advantages over conventional tumor staging techniques¹, the objectives of this study are to measure exposures of the staff of a private hospital with a high volume demand Nuclear Medicine service in Recife - PE and observed the variations in the results with respect to position of the dosimeter on different fingers or on the wrist.

Material and method: Monitoring was performed using TLD-100 dosimeters, on a voluntary basis, where each exposed worker used one dosimeter on each finger and wrist (right and left hands). For data evaluation purposes, the following information was noted: professional performance, experience time, workload and dominant hand). In addition, every procedure performed by the worker (fractionation or administration), type of radionuclide and radioactive activity was collected. Initially, monitoring was performed at the base of each finger, then only the measurements performed on the thumb, index and middle fingers were used to assess the occupational dose distribution with wrist monitoring, commonly used in nuclear medicine services and results compared to reportade data from outhter authors².

Results: Unlike most Nuclear Medicine Services, the one used for this study, a single professional is responsible for the fractionation and administration procedures. For this reason, all data were considered together, regardless of the procedure. Table 1 shows the results of the monitoring performed at the highest dose points on the fingers of the dominant and non-dominant hands and on the wrist.

Hands		Hp(0.07) in mSv			
		Thumb	Index Finger	Middle Finger	Wrist
ND	Range	3.32-14.28	3.31-23.17	2.90-17.12	0.29-3.73
	Median	6.84	7.01	8.08	0.81
	Mean	7.92	9.09	8.04	1.37
D	Range	1.61-8.99	1.75-14.35	2.09-10.92	0.23-2.73
	Median	4.75	5.49	4.86	0.89
	Mean	4.64	5.86	5.40	1.19

Table 1: Dose values Hp(0.07) found in this study at diferente measurement points.

It was observed that the dose values in the non-dominant hand, not finding significant variations between the different positions in the fingers. Variations in dose distribution are significantly lower for wrist positions when compared to the base of the most exposed finger (by a factor of 6). This study shows that when estimating the annual dose of exposed workers, it is possible that the annual dose limit (500 mSv) is exceeded in some cases.

Conclusions: According to the results, the use of pulse dosimeters (the type of monitoring chosen as the standard by the Nuclear Medicine service under study) should be avoided due to an underestimation of the maximum measured dose. There is a possibility that factors such as shielding and workload are determinant for the high dose values.

References:

1. Townsend, D.W. Combined PET/CT: the historical perspective. *Semin Ultrasound CT MR.* 2008; 29: 232–235.
2. CARNICER, A., et al., 2011, "Hand Exposure in Diagnostic Nuclear Medicine with 18F- and 99mTc-Labelled Radiopharmaceuticals - Results of the ORAMED Project", *Radiation Measurements*, v. 46, pp.1277-1282.