

**AUDITS IN HIGH DOSE RATE BRACHYTHERAPY IN BRAZIL**

M.H. MARÉCHAL, L.A. ROSA, A.VELASCO, E. de PAIVA, M. GONÇALVES,
L.C. CASTELO

Instituto de Radioproteção e Dosimetria (IRD), Rio de Janeiro, Brazil

The lack of well established dosimetry protocols for HDR sources is a point of great concern regarding the uniformity of procedures within a particular country [1]. The main objective of this paper is to report the results of an implementation of the audit program in dosimetry of high dose rate brachytherapy sources used by the radiation therapy centers in Brazil.

In Brazil, among 169 radiotherapy centers, 35 have HDR brachytherapy systems. This program started in august 2001 and until now eight radiotherapy services were audited. The audit program consists of the visit in loco to each center and the evaluation of the intensity of the source with a well type chamber specially design for HDR ^{192}Ir sources.

The measurements was carried out with a HDR1000PLUS Brachytherapy Well Type Chamber and a MAX 4000 Electrometer, both manufactured by Standard Imaging Inc. The chamber was calibrated in air kerma strength by the Accredited Dosimetry Calibration Laboratory, Department of Medical Physics, University of Wisconsin in the USA.

The same chamber was calibrated in Brazil using a ^{192}Ir high dose rate source whose intensity was determined by ^{60}Co gamma rays and 250 kV x rays interpolation methodology [2] [3], The Nk of ^{60}Co and 250 kV x rays were provided by the Brazilian National Standard Laboratory for Ionizing Radiation (LMNRI).

I was recorded, for each center, the method and type of chamber used by the physicist to measure the intensity of the sources in his routine work. The certificate of calibration value, provided by the source manufacturer, was also recorded.

The table 1 shows the results and the model of the HDR system for all centers. Among the 8 centers audited, 3 used the farmer type chamber calibrated according to the interpolation methodology [3], method A. The remaining centers employed well type chambers, method B.

Table 1. Air kerma strength values measured by the radiation therapy centers audited ($S_{K,center}$) and the IRD ($S_{K,IRD}$). The values obtained from the certificate of calibration are presented as well. $\Delta\%Center$ is the percent difference between the center value and IRD value. $\Delta\%Certif$ is the percent difference between the certificate value and the IRD value.

Centers	Equipment	Method	$S_{K,center}$ $\text{mGy}\cdot\text{m}^2\cdot\text{h}^{-1}$	$S_{K,certif}$ $\text{mGy}\cdot\text{m}^2\cdot\text{h}^{-1}$	$S_{K,IRD}$ $\text{mGy}\cdot\text{m}^2\cdot\text{h}^{-1}$	$\Delta\%center$	$\Delta\%Certif$
1	Nucletron Micro Selectron			9.23	9.32		0.97%
2	Nucletron Micro Selectron	B	30.80	30.42	30.83	0.11%	1.33%
3	Varian Varisourse MDS Nordion	A	16.72	16.94	16.71	0.10%	1.41%
4	Gamma-Med Plus Nucletron Micro	B	14.39	17.98	17.74	8,11%	1.30%
5	Selectron Varian	A	7.87	7.89	8.03	2.03%	1.83%
6	Vari Source Nucletron Micro	B	18,26	17,10	18,07	1,10	5,43%
7	Selectron Nucletron Micro	A	29.09	29.24	29.16	0.20%	0.30%
8	Selectron	A	56,33	48,14	47,04	19.80%	2,38%

The most important difference obtained, 19,8%, can be explained by lack of knowledge of the physicist about the interpolation methodology for the farmer type chamber calibration. The 8% percent difference value obtained with a well type chamber is, perhaps, due to the lack of an updated calibration factor of this chamber. The remaining results indicated that there is no difference between the methods applied.

REFERENCES

- [1] de Almeida CE., Pereira AJ. and Marechal M.H., Intercomparison of calibration procedures for ^{192}Ir HDR sources in Brazil, *Phys méd. And Biol*, 44(3): N31-8, 1999.
- [2] Marechal M. H., Doctoral Dissertation, Desenvolvimento de uma metodologia de calibração de fontes de ^{192}Ir de alta taxa de dose, Universidade do Rio de Janeiro, 1998.
- [3] Calibration of Brachytherapy Sources, IAEA-TECDOC-1079, 1999.