

IRD – Instituto de Radioproteção e Dosimetria
LNMRI — Laboratório Nacional de Metrologia das Radiações Ionizantes
Radionuclide Report — 2011/2012

1- Direct Standardization

1.1 — Coincidence counting

- ^{99}Tc

1.2— Anticoincidence counting

- $^{68}\text{Ge}/\text{Ga}$, ^{99}Tc , ^{60}Co

1.3 — Sum-peak counting

- ^{18}F , ^{22}Na , ^{65}Zn , ^{68}Ge **2- Liquid scintillation counting**

2.1- CIEMAT/NIST method

- ^{99}Tc ,

2.2 TDCR

- ^{99}Tc , $^{68}\text{Ge}/\text{Ga}$ **4- Traceability program**

4.1 – Quality assurance program for activity measurements in Nuclear Medicine.

- Continuing the traceability program, started at 1999, for analyzing the performance of radionuclide calibrators used in nuclear medicine. LNMRI/IRD organized, in 2012, a comparison with solutions of $^{99}\text{Tc}^m$, ^{131}I , ^{67}Ga , ^{201}Tl , ^{131}I and ^{131}I capsules involving 42 nuclear medicine clinics which generated 151 results.

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4.2 – Ionization Chamber System - Centronic-IG11

- Determination of calibration factor for:

 $^{68}\text{Ge}/\text{Ga}$, ^{60}Co - Long-term stability study with ^{226}Ra source

4.3- Regional laboratories network for nuclear medicine radionuclide measurements

Regional laboratory of South region organized comparison with 13 nuclear medicine clinics generating 52 results of ^{99m}Tc , ^{131}I , ^{67}Ga and ^{201}Tl . In order to maintain the control of radionuclide calibrators for ^{18}F three sources of $^{68}\text{Ge}/\text{Ga}$ were sent to regional laboratories.

4.4- Quality control program in radionuclide analysis in environmental samples performed by 28 Brazilian laboratories

Continuing the traceability program, started in 1991. The LNMRI/IRD organized in 2011 and 2012, 6 comparisons runs with 15 radionuclides used in environmental spiked samples, in four different types of matrix.

5 – Quality System

- The LNMRI quality system was submitted by three internal audits.

6- Publications

6.1 - 2011/2012

- Rezende, E.A., E. A.; Correia, A.R. ; Iwahara, A. ; da Silva, C.J. Tauhata L. ; Poledna R. ; da Silva R.L. ; de Oliveira, E.M. ; de Oliveira, A.E. Radioactivity measurements of ^{177}Lu , ^{111}In and ^{123}I by different absolute methods. Applied Radiation and Isotopes, v.70, p.2081-2086, 2012.
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- Oliveira, E. M.; Iwahara, A.; Poledna R. ; Delgado J.U.; da Silva, C.J.; Tauhata, L. ; da Silva, R. L.; Lopes, R.T. . Standardization of ^{65}Zn by sum-peak method. Applied Radiation and Isotopes, v. 70, p. 2087-2090, 2012.
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- Chaves, Tainá Olivieria ; Iwahara, Akira ; Tauhata, Luiz ; Rezende, Eduarda Alexandre ; Correia, Amanda Ribeiro ; Oliveira, Estela Maria . Calibration of the LNMRI Secondary Standard Ionization Chamber for ^{131}I capsules used in nuclear medicine. Journal of Radioanalytical and Nuclear Chemistry (Print), v. 293, p. 211-216, 2012.
- Correia, Amanda Ribeiro; Iwahara, Akira ; Tauhata, Luiz ; Rezende, Eduarda Alexandre ; Chaves, Tainá Olivieri ; de Oliveira, A.E. ; de Oliveira, E.M. Fatores de correção volumétrica na medição de atividade de $^{99\text{m}}\text{Tc}$ e ^{123}I em calibradores de radionuclídeos. RB. Radiologia Brasileira (Print), v. 45, p. 93-97, 2012.
- da Silva, C.J. ; Iwahara, A.; Moreira, D.S.; Delgado J. U.; Gomes, R.S. ; ^{57}Co half-life determination. Applied Radiation and Isotopes, v. 70, p. 1924-1926, 2012.

6.2 – 2009-2010

- National comparison of ^{131}I measurement among nuclear medicine clinics of eight countries, V. Olsovcova, A. Iwahara, P. Oropesa, L. Joseph, A. Ravindra, M. Ghafoori, Hye-K. Son, M. Sahagia, S. Tastan, B. Zimmerman. Applied Radiation and Isotopes 68 (2010) 1371-1377.
- The ^{124}Sb activity standardization by gamma spectrometry for medical applications, M. C. M. de Almeida, A. Iwahara, J. U. Delgado, R. Poledna, R. L. da Silva, Nuclear Instruments and Methods in Physics Research A 619 (2010) 365-367.

- International exercise on ^{124}Sb activity measurements, B. Chauvenet, M.-M. Bé, M.-N. Amiot, C. Bobin, M.-C. Lépy, T. Branger, I. Lanièce ; A. Luca, M. Sahagia, A.-M. Wätjen ; K. Kossert, O. Ott, O. Nähle ; P. Dryak, J. Sochorová, P. Kovar, P. Auerbach ; T. Altitzoglou, S. Pommé, G. Sibbens, R. Van Ammel, J. Paepen ; A. Iwahara, J.U. Delgado, R. Poledna, Carlos J. da Silva ; L. Johansson, A. Stroak ; C. Bailat, Y. Nedjadi, P. Spring. *Applied Radiation and Isotopes* 68 (2010) 1207-1210.
- Comparison of activity measurements in nuclear medicine services in Pernambuco, M. da C. Fragoso, A. M. de A. Albuquerque, F. P. Barreto, A. Iwahara, R. de A. Lima, F. F. de Lima, M. Oliveira. *Alasbimn Journal* Year 13, No 50, October 2010/Año 13, No 50, Article AJ50-4 (2010) 1-7.
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6.3 2007/2008

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- Carlos J. da Silva, A. Iwahara, R. Poledna, E.M. de O. Bernardes, M.A.R.R. de Prinzio and Ricardo T. Lopes. Standardization of ^{67}Ga , ^{51}Cr and ^{55}Fe by live-timed anti-coincidence counting with extending dead time. *Appl. Radiat. Isot.* 66 (2008) 231-235.
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6.4 - 2005-2006

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7- Source Preparation

- During last two years the Radionuclide Group supplied to users 559 low level-activity sources for application in metrology, environmental control and radiation protection areas.

8- Technical Cooperation

8.1- LNHB

- In the field of radionuclide standardization and data acquisition system.

8.2 –NIST

- In the field of radionuclide standardization.

9- Training Program

9.1 Students

- We have 2 students for MSc. level and 3 students for PhD level.

9.2 Fellowship

- Denise S Moreira - 6 months at NIST – In the field of standardization of radionuclides with application of Monte Carlo code.

- Paulo A. L. da Cruz -1 month at LNHB – In the standardization with TDCR.

- Maura J.C.S. Bragança – 1 month at ENEA in air filters preparation.