

**IRD – Instituto de Radioproteção e Dosimetria**  
**LNMRI — Laboratório Nacional de Metrologia das Radiações Ionizantes**  
**Radionuclide Report — 2003/2004**

**1- Direct Standardization**

1.1 — Coincidence counting

-  $^{201}\text{Tl}$ ,  $^{203}\text{Hg}$ 

1.2 — Sum-peak counting

-  $^{125}\text{I}$ 

1.3 — Pressurized Proportional Counter

-  $^{109}\text{Cd}$ **2- Liquid scintillation counting**

2.1- CIEMAT/NIST method

-  $^{65}\text{Zn}$ ,  $^{241}\text{Am}$ ,  $^{204}\text{Tl}$ **3- Nuclear decay data measurement**

3.1 Half-life determination

-  $^{54}\text{Mn}$ ,  $^{65}\text{Zn}$ ,  $^{67}\text{Ga}$ ,  $^{201}\text{Tl}$ ,  $^{203}\text{Hg}$ 3.2  $\gamma$ -ray emission probabilities determination-  $^{54}\text{Mn}$ ,  $^{65}\text{Zn}$ ,  $^{201}\text{Tl}$ ,  $^{203}\text{Hg}$ **4- Traceability program**

4.1 - Traceability with Brazilian hospitals

- Continuing the traceability program, started in 1998, for the radionuclide calibrators used in Brazilian hospitals, LNMRI/IRD organized, in 2003 and 2004, two intercomparison runs with the main radionuclides used in nuclear medicine services.

4.2 – Activity characterization of  $^{192}\text{Ir}$  brachytherapy wires

- Study of activity homogeneity on wire sources manufactured by IPEN
- Determination of IG 12 calibration factor for  $^{192}\text{Ir}$  wires

4.3- Regional laboratories network for radionuclide measurements

- LNMRI have been working to implement radionuclide laboratories network in order to establish the traceability of radioactivity measurements in Nuclear Medicine Services. At present two laboratories have been established: DIPLAN – Brasília district, Brazilian Center-west region and another one at Rio Grande do Sul University (UFRS), Brazilian South region. The next laboratory will be located at Recife (CRCN), Brazilian Northeast region.

International Atomic Energy Agency initially supported this project.

4.4- Quality control program in radionuclide analyses in environmental samples performed by 24 Brazilian laboratories

- Continuing the traceability program, started in 1991. The LNMRI/IRD organized in 2003 and 2004, 6 comparisons runs with 25 radionuclides used in environmental spike samples, in four different types of matrix.

## 5 – Quality System

- Quality system with ISO NBR 17025 was implemented
- Peer review process on 2004

## 6- Publication

- Joyra A. dos Santos, A. Iwahara, Antônio E. de Oliveira, Mônica A. L. da Silva, Carlos J. da Silva, Luiz Tauhata and Ricardo T. Lopes, National intercomparison program for radiopharmaceutical activity measurements. *Appl. Radiat. Isot.*, 60 / 2,4 (2004) 523-527.
- J. Morel, S. Sepman, M. Rasko, E. Terechtchenko and José U. Delgado. Precise determination of photon emission probabilities for the main X- and  $\gamma$ -rays of  $^{226}\text{Ra}$  in equilibrium *with daughters*. *Appl. Radiat. Isot.*, 60 / 2, 4 (2004) 341-346.
- Karla C. Souza, Mônica A. L. Da Silva, José Ubiratan Delgado, Roberto Poledna, Ricardo T. Lopes and C. J. Da Silva. *Measurements of nuclear data parameters of  $^{201}\text{Tl}$  by gamma-ray spectrometry*. *Appl. Radiat. Isot.*, 60 / 2,4 (2004) 307-310.
- M. J.C. S. Bragança, L. Tauhata, A. F. Clain, I. Moreira, *The use of instrumental neutron activation and multivariate statistic analysis in differentiation of Brazilian phosphate ores*, *Appl. Radiat. Isot.* 61 (2004) 351-355
- Mônica A. L. da Silva, Maria C. M. de Almeida, Carlos J. da Silva and José Ubiratan Delgado. *Use of the reference source method to determine the half-lives of radionuclides of importance in nuclear medicine*. *Appl. Radiat. Isot.*, 60 / 2,4 (2004) 301-305

## 7- Publication in progress

- Iwahara, M. A. L. da Silva, A. E. C. Filho, E. M. De O. Bernardes, J. U. Delgado, *Determination of Disintegration Rates and  $\gamma$ -ray emission probabilities of  $^{65}\text{Zn}$  and  $^{241}\text{Am}$* , *Appl. Radiat. Isot.*, (2005) in press.
- Mônica A. L. Da Silva, Maria C. M. De Almeida and José Ubiratan Delgado. *Measurements of half-lives of radionuclides by reference method*. *J. Radioanl. Nucl. Chem.* (2005) in press.

## 8- Technical Cooperation

### 8.1- LNHB

- In the field of gamma spectrometry and data acquisition system.