

**IRD – Instituto de Radioproteção e Dosimetria**  
**LNMRI — Laboratório Nacional de Metrologia das Radiações Ionizantes**  
**Radionuclide Report — 2005/2006**

**1- Direct Standardization**

1.1 — Coincidence counting

-  $^{51}\text{Cr}$ ,  $^{54}\text{Mn}$ ,  $^{241}\text{Am}$ ,  $^{192}\text{Ir}$ 

1.2— Anticoincidence counting

-  $^{51}\text{Cr}$ ,  $^{54}\text{Mn}$ ,  $^{67}\text{Ga}$ ,  $^{241}\text{Am}$ ,  $^{243}\text{Am}$ ,  $^{131}\text{I}$ ,  $^{55}\text{Fe}$  (trace with  $^{54}\text{Mn}$ )

1.3 — Sum-peak counting

-  $^{125}\text{I}$ ,  $^{51}\text{Cr}$ ,  $^{22}\text{Na}$ **2- Liquid scintillation counting**

2.1- CIEMAT/NIST method

-  $^{55}\text{Fe}$ ,  $^{241}\text{Am}$ **3- Nuclear decay data measurement**

3.1 Half-life determination

-  $^{54}\text{Mn}$ ,  $^{65}\text{Zn}$ ,  $^{67}\text{Ga}$ ,  $^{201}\text{Tl}$ ,  $^{203}\text{Hg}$ ,  $^{51}\text{Cr}$ 3.2  $\gamma$ -ray emission probabilities determination-  $^{54}\text{Mn}$ ,  $^{65}\text{Zn}$ ,  $^{201}\text{Tl}$ ,  $^{203}\text{Hg}$ ,  $^{51}\text{Cr}$ **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 2005 and 2006, two-comparison runs with the main radionuclides used in nuclear medicine services.

4.2 –Implementation of another ionization chamber system with Centronic-IG11

- Determination of calibration factor for:

-  $^{54}\text{Mn}$ ,  $^{65}\text{Zn}$ ,  $^{67}\text{Ga}$ ,  $^{201}\text{Tl}$ ,  $^{203}\text{Hg}$ ,  $^{60}\text{Co}$ ,  $^{133}\text{Ba}$ ,  $^{152}\text{Eu}$ ,  $^{243}\text{Am}$ - Long-term stability study with  $^{226}\text{Ra}$  source

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. We transfer to CRCN an Ionization Chamber Centronic-IG-12 that will be used as reference system to calibrate radionuclides used in nuclear medicine. 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, LNMRI/IRD organized in 2005 and 2006, six 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 requirements has been implemented
- Two internal audits

## 6- Publication

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### **7- Source Preparation**

- In last two years SEMRA/LNMRI supplied to users with 1331 low-level activity sources for radiation protection and environmental control areas.

### **8- Technical Cooperation**

8.1– LNHB / France – Use of gamma spectrometry and data acquisition system.

8.2 – IAEA / Austria - Measurements of radionuclides applied to Nuclear medicine services.