IRD – Instituto de Radioproteção e Dosimetria

LNMRI – Laborátório Nacional de Metrologia das Radiações Ionizantes

Radionuclide Report - 2001/2002

1- Direct Standardization

1.1- Coincidence counting and proportional counting method

- Standardization of ^{32}P, ^{204}Tl solutions

1.2- Liquid scintillation method

- Standardization of ^{32}P, ^{204}Tl and ^{109}Cd solutions

2- X and γ-ray spectrometry

2.1- Half - life and impurity studies

- Half-life determination of radionuclides used in nuclear medicine, impurity study by gamma-ray spectrometry.

2.2- Determination of photon emission probability

- Measurements of nuclear data parameters in the standardization of ^{241}Am, ^{65}Zn, ^{109}Cd, and ^{192}Ir.

3- Traceability Program

3.1- BIPM key comparisons of ^{32}P and ^{204}Tl

- LNMRI took part in the key comparisons promoted by BIPM.

3.2- CIEMAT comparison

- ^{109}Cd

3.3 - Treaceability with Brazilian hospitals

- Continuing the traceability program, started in 1998, for the radionuclide calibrators used routinely in Brazilian hospitals, LNMRI/IRD organized, in 2001

and 2002, several intercomparison runs with the main radionuclides used in nuclear medicine services.

For ^{123}I, two regional intercomparisons of activity measurements of solutions were organized. Participants were hospitals localized in the State of Rio de Janeiro. In the first round, with 9 participants, 56% of the results had performance within the limits of ± 10% accuracy recommended by Brazilian Regulatory Authority. In the second round, with 18 participants, 45% were considered within the recommended limits.

DIPLAN/Brasília carried out the intercomparison for ^{131}I solution, with the participation of 18 hospitals localized in the center-west region of Brazil. The radionuclide calibrator used by DIPLAN/Brasília was calibrated by standards of ^{131}I and ^{99m}Tc supplied by LNMRI.
The activities developed by DIPLAN for the organization of the intercomparison are part of a project for the implementation of the network of regional laboratories for radionuclide metrology. This network is focused mainly on the establishment of a quality assurance program of activity measurement for the radionuclides used in nuclear medicine services in the whole Brazil.

For ^{99m}Tc an intercomparison was promoted with two runs of measurements. The first, with 18 participants localized in the center-west region of Brazil, and the second, with 24 participants from Rio de Janeiro state. In the center-west region 63% of the results obtained were considered within the recommend limit, and in Rio de Janeiro state this percentile was of 75%.

For ^{201}Tl, LNMRI promoted an intercomparison run with 8 participants localized in the Rio de Janeiro city, and 69% of the results were considered acceptable. The low number of participants is due to the small use of this radionuclide by the hospitals of Rio de Janeiro.

3.4- Quality control program of environmental measurements laboratory

- Continuing the traceability program, started in 1991, for 24 Brazilian laboratories of radionuclide determination in environmental samples. The LNMRI/IRD organized, in 2001 and 2002, six intercomparison runs with the fifteen radionuclides used in environmental control.

4- Quality System

4.1- Implementation of main requirement of NBR 17025

4.2- Revision of the proceedings for quality system

5- Publication

Iwahara, A. E. de Oliveira, L. Tauhata, C. J. da Silva, P. G. da Silva, A. M. S. Braghirolli and R. T. Lopes, Performance of a dose calibrators in Brazilian hospitals for activity measurements, Appl. Radiat. Isot., 56 / 1,2 (2002) 361-367.

C. J. da Silva, A. Iwahara, J.U. Delgado, L. Tauhata, R. Poledna, and R. N. Alves, Absolute determination of activity per mass and half-life measurements of ^{152}Eu., Appl. Radiat. Isot., 56 / 1,2 (2002) 169-172.

E. M. B. de Oliveira, J.U. Delgado, L. Tauhata, C. J. da Silva, A. Iwahara, R. Poledna, A.S. Paschoa, ^{166m}Ho a multi- □ standard for the calibration of Ge spectrometers, Appl. Radiat. Isot., 56 / 1,2 (2002) 157-161.

J.U. Delgado, J. Morel, M. Etcheverry, Measurements of photon emission probabilities from the decay of ^{226}Ra and daughters, Appl. Radiat. Isot., 56 / 1,2 (2002) 137-143.

L. Tauhata, M. E. C. Vianna, A. E. de Oliveira, A. C. M. Ferreira, C. C. S. da Conceição, Metrological capability of the Brazilian laboratories of analyses of radionuclides in environmental samples, Appl. Radiat. Isot. 56 / 1,2 (2002) 409-414.

P. A. L. Cruz, J. S. Loureiro and E. M. O . Bernardes, Standardization of a ^{89}Sr solution from a BIPM intercomparison using a liquid scintillation method, Appl. Radiat. Isot., 56 / 1,2 (2002) 457-459.

6- Publication in progress

6.1- Submitted to ICRM/2003 meeting

Determination of the half-life of the radiopharmaceuticals by reference source method ; Mônica A. L. da Silva, Maria C. M. de Almeida, Carlos J. Da Silva and José U. Delgado

Measurements of nuclear data parameters of ^{201}Tl by gamma-ray Spectrometry ; Karla C. de Souza, Mônica L. da Silva, José U. Delgado, Roberto Poledna, Ricardo T. Lopes and Carlos J. da Silva

National Intercomparison Program for Radiopharmaceutical Activity Measurements ; J. A. dos SANTOS, A. IWAHARA, A. E. de OLIVEIRA, M. A. L. da Silva, L. TAUHATA and R. T. LOPES

The absolute standardization of ^{32}P and ^{204}Tl at LNMRI; Paulo A. L. da Cruz, Akira Iwahara, Estela M. O. Bernardes and Carlos J. da Silva

7- Technical Cooperation

7.1- LNHB

The cooperation involves the measurement technique in the field of gamma spectrometry, liquid scintillation and coincidence counting.

7.2 – CIEMAT

The cooperation involves the treaceability program and liquid scintillation counting method.

8- Scientific Visit

Brian Zimmermam – NIST
Leonor Barqueiro - CIEMAT

9- Fellowship

Roberto Poledna – LNHB/France