

## IUPAC Project Progress Report

**Date:** December 2005 ; Period: July 2005 – February 2006

**Project number:** 2003-015-1-500

**Project Title:** Terminology, quantities and units concerning Production and Applications of radionuclides in radiopharmaceutical and Radioanalytical Chemistry

**Task Group Leader:** Mauro L. Bonardi

**Starting date:**

**Report:**

1. Projected completion date (documents ready for external review): expected 2006
2. Have the project objectives been modified during the last 6 months? NN
3. Please list the task group members involved in the work during the last 6 months: Zeev B. Alfassi, Ren Iwata, Vladimir Kolotov, Geerd Meyer, David Shlyer, Leonard Wiebe.
4. Difficulties encountered (or concerns): NN
5. Please list the to-date results (outputs) of the project: new definitions of concepts, terminology, quantities and units concerning isotopic and non-isotopic carrier, carrier free, no carrier added, carrier added, specific activity, isotope dilution factor, radiochemical separation, chemical and radiochemical yield. Related topics.
6. Please list the dissemination events (viz. articles, CD, conference presentations; etc.)

(i) already accomplished;

**Publications/articles:**

- Z.B. Alfassi, F. Groppi, M.L. Bonardi, J.J.M. de Goeij, On the “artificial” nature of Tc and the “carrier-free” nature of  $^{99m}\text{Tc}$  from  $^{99}\text{Mo}/^{99m}\text{Tc}$  generator, *Appl. Rad. Isot.*, 63 (2005) 37-40.
- M. L. Bonardi, J. J. M de Goeij, How do we ascertain specific activities in no-carrier-added radionuclide preparations?, *J. Radioanal. Nucl. Chem.*, 263 (2005) 87-92.
- J.J.M. de Goeij, M. L. Bonardi, How do we define the concepts specific activity, radioactive concentration, carrier, carrier-free and no-carrier-added?, *J. Radioanal. Nucl. Chem.*, 263 (2005) 13-18.
- F. Groppi, M.L. Bonardi, C. Birattari, E. Menapace, K. Abbas, U. Holzwarth, A. Alfarano, S. Morzenti, C. Zona, Z.B. Alfassi, Optimisation study of alpha-cyclotron production of  $^{211}\text{At}/^{211}\text{Po}$  for high-LET metabolic radiotherapy purposes, *Appl. Rad. Isot.*, 63 (2005) 621-631.

- E. Menapace, C. Birattari, M.L. Bonardi, F. Groppi, Experimental results and model calculation of excitation functions relevant to the production of specific radioisotopes for metabolic radiotherapy and for PET, *Rad. Phys. Chem.*, 71 (2004) 943-945.
- M.L. Bonardi, F. Groppi, C. Birattari, E. Menapace, Radioanalytical techniques based on the use of very High Specific Activity "No Carrier Added" radionuclides, *Trans. of the ANS*, 87 (2002) 442-443.
- M.L. Bonardi, F. Groppi, E. Rizzio, M. Gallorini, Radioanalytical Quality Controls by INAA and RNAA determination of Specific Activity, Chemical Purity and Isotopic Composition of labelled compounds, *Trans. of the ANS*, 89 (2003) 679-680.
- M. L. Bonardi, C. Birattari, F. Groppi, L. Gini and H. S. Mainardi, Cyclotron production and quality control of "High Specific Activity" radionuclides in "No Carrier Added" form for radioanalytical applications in life sciences, *J. Radioanal. Nucl. Chem.*, 259 (2004) 415-419.
- F. Groppi, H. S. Mainardi, A. Martinotti, S. Morzenti, M. L. Bonardi, The use of liquid scintillation spectrometry as a very sensitive radioanalytical tool for the determination of alpha, beta and monochromatic electron emitting impurities in radiopharmaceutical compounds, *J. Radioanal. Nucl. Chem.*, 263 (2005) 521-525.
- M.L. Bonardi, Critical review of the "Handbook on Nuclear Chemistry": by A. Vértes, S. Nagy and Z. Klencsár (Eds.) 5 Volumes, Kluwer Academic, The Netherlands, *Rad. Phys. Chem.*, 72 (2005) 737-738.
- D. Bagatti, M.C. Cantone, A. Giussani, M.L. Bonardi, F. Groppi, C. Birattari, M. Gallorini, E. Rizzio, Analytical and radioanalytical quality control of purity and stability of radiopharmaceutical compound [<sup>186</sup>Re]HEDP for bone metastases pain palliation, *J. Radioanal. Nucl. Chem.*, 263-2 (2005) 515-520.
- Z.B. Alfassi, F. Groppi, On the determination of the thermal neutron flux density by the measurement of the activity ratio <sup>199</sup>Au/<sup>198</sup>Au, *Rad. Meas.*, 39 (2005) 561-563.
- D. Bagatti, M. C. Cantone, A. Giussani, S. Ridone, C. Birattari, M. L. Bonardi, F. Groppi, A. Martinotti, S. Morzenti, M. Gallorini, E. Rizzio, Analytical and radioanalytical quality control of purity and stability of radiopharmaceutical compound [<sup>186</sup>gRe]Re-HEDP for bone metastases pain palliation, *J. Radioanal. Nucl. Chem.*, 263 (2005) 515-520.

#### Conferences:

- E. Menapace, C. Birattari, M.L. Bonardi, F. Groppi, L. Gini, C.H.S. Mainardi, A. Martinotti, S. Morzenti, Calculation and experimental measurement of excitation functions for production of metabolic therapeutic radionuclides, Proc. "Coordinated Research Meeting, IAEA", Vienna, Austria, Jun 2003, Report IAEA-INDC/NDS-444. No expenses for IUPAC.
- M.L. Bonardi, C. Birattari, F. Groppi, L. Gini, E. Menapace, I.R. Bellobono, A rapid improved method for gamma spectrometry determination of thallium-202 impurities, in [<sup>201</sup>thallium]labelled radiopharmaceuticals, Proc. "World Conference on Medical Physics and Biomedical Engineering - WC2003", Sydney, Australia, Aug 2003. No expenses for IUPAC.
- F. Groppi, M.L. Bonardi, C. Birattari, E. Menapace, K. Abbas, U. Holzwarth, A. Alfarano, S. Morzenti, C. Zona, Z.B. Alfassi, Optimisation study of alpha-cyclotron production of At-211/Po-211g for high-LET metabolic radiotherapy purposes, 8th

International Conference on Applications of Nuclear Techniques, Crete, Greece, Sep 2004. No expenses for IUPAC.

- M.L. Bonardi, The new IUPAC Project on “Terminology, quantities and units concerning Production and Applications of radionuclides in radiopharmaceutical and Radioanalytical Chemistry, Winter Meeting of the ANS, Washington DC, USA Nov 2004, invited paper, session organization. No expenses for IUPAC.

(ii) planned

**Conference:**

- 7<sup>th</sup> Int. Conference on Methods and Applications of Radioanalytical Chemistry, MARC-VII, Kona, USA, April 2006, invited papers, session organization. No expenses for IUPAC.

7. If your project is within 6 months of completion, how do you plan to utilise any remaining budget for this project? NN

8. Work on this project may have identified new problems, issues, challenges, emerging topics, opportunities for related projects, etc. Please indicate these here so that the Division can follow up on them. NN