

# **IAEA Proposal for 2005-2006 Cycle**

Submitted by

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## 1. Title of the Project

The Promotion of Updated Nuclear Medicine in Asia

## 2. Background

In the beginning of this new millenium, the nuclear medicine has a chance to grow up again with the rapid spread of PET(positron emission tomography), cyclotron, therapeutic radiopharmaceuticals and molecular nuclear medicine. PET is now an important diagnostic tool with F-18 FDG (fluorodeoxyglucose) for cancer and neurological patients in Japan, China and South Korea. F-18 labeled amino acid, nucleic acid and cancer drugs shows positive future in nuclear oncology. Several new therapeutic radiopharmaceuticals are being developed with Tungsten-Rhenium (W-188/Re-188) generator, and researches on radiolabeled oligonucleotides or substrates for the reporter gene enzyme progress rapidly.

Despite these prospects, most of the developing and underdeveloped nations in Asia lack of specialists, equipments, research funds and supports from their governments for nuclear medicine and especially for PET.

South Korea became one of the leading countries presenting the fourth-largest number of the papers in the annual meetings of the Society of Nuclear Medicine of the United States of America. In South Korea, three cyclotrons (two PET-dedicated cyclotrons and one 50 MeV cyclotron) and seven PET scanners are in operation, and two more cyclotrons (one PET-dedicated cyclotron and one RI-producing 30 MeV cyclotron) are being installed in this year of 2001. South Korea is able to promote the most updated nuclear medicine such as clinical PET and molecular nuclear medicine in these developing Asian countries by training experts and transferring related updated technologies.

To promote Asian nuclear medicine, there had already been AOFNMB (Asia & Oceania Federation of Nuclear Medicine and Biology), in which geographical, cultural and economical heterogeneity prevails. Among the RCA participating countries, China, Japan and Korea established a Joint Conference, which is held biannually to share their experience. But the developing and underdeveloped Asian countries have less opportunity to share and upgrade their situation by better regional scientific activities such as regional conference, training young fellows, expert exchange programs.

In the year 2006, South Korea shall host the 9th Congress of World Federation of Nuclear Medicine and Biology. To make this Congress more successful and

beneficial to all the Asian countries, ARCCNM (Asian Regional Cooperative Council for Nuclear Medicine) has just been organized. This Council will foster Asian regional cooperation in the promotion of nuclear medicine in Asian countries, particularly in the developing and underdeveloped countries.

### 3. Justification of the Project

PET already became an important diagnostic tool for staging disease, evaluating the effect of treatments, and long-term follow-up of cancer patients in the developed countries. They call it clinical PET. Clinical PET reduced the national medical costs by detecting cancer in very early stages resulting in the cure, preventing unnecessary surgery, modifying optimally the treatment protocol and detecting the recurrence very early, which allows effective treatment. But in underdeveloped countries, clinical PET practice is far from daily clinical routine because of the lack of experts, equipments and funds. To be prepared for the age of clinical PET, these countries need proper training of the experts and the transfer of PET related technologies before they are to take efforts to get budget for the PET/cyclotron facilities. Although PET related chemistry and cyclotron related technology are the already-established technologies in Western countries, it will take long time and persistent support to get these technologies/experts to these underdeveloped countries.

Apart from PET technologies, future of the nuclear medicine depends entirely upon the therapeutic radiopharmaceuticals and dosimetry-based technology regarding treatment-planning. Ho-166 chitosan has just been approved by Korean FDA as a therapeutic drug for liver cancer. Besides Ho-166, how fantastic it is that Tungsten-Rhenium (W-188, Re-188) generator is now widely available, which gives us great chance to jump up in the radionuclide cancer therapy and prevention of restenosis in coronary artery. Several radiopharmaceuticals labeled with Re-188 are developed and under clinical trials. Other reactor radionuclides such as Sm-153 and Re-186 are available in Asia, which will also accelerate research and development in radionuclide therapy.

Gene therapy is coming into clinical practice, and nuclear medicine meets another chance of promotion with radiolabeled oligonucleotide and substrates for the reporter gene enzyme. Oligonucleotide labeled with Auger electron emitting radionuclide such as I-125 could be used to cut specific site on the DNA double helix, which will be called as Molecular Surgery. The quantification of the expression of transferred gene is important to predict the effect of gene therapy,

and reporter gene is inserted together with the therapeutic gene in the vector to show the amount of gene expression with the radiolabeled substrate for the enzyme from the reporter gene. This technology is proved by animal experiments, and is waiting for the clinical use.

It takes long time and persistent support to get those technologies and experts onto practical level in underdeveloped countries. Leading countries in Asia such as Japan, China and Korea could support those developing and underdeveloped Asian countries through ARCCNM and this project.

#### 4. Objectives

1. To establish liaison with the official national bodies of nuclear medicine and with international organizations (IAEA) for the promotion of nuclear medicine in Asian areas;
2. To enhance regional scientific activities by way of conferences, seminars and educational programs and to encourage research collaborations in the field of updated nuclear medicine, particularly PET technology;
3. To work out training programs and to facilitate exchange programs for experts, trainees and fellows through newly established fixed body, Asian School of Nuclear Medicine;

#### 5. Expected Outputs/Results

ARCCNM will enhance regional scientific activities by way of conferences, seminars and educational programs in liaison with international organizations. Also task groups in nuclear oncology, neurology, cardiology, radionuclide therapy, general nuclear medicine and basic sciences, and three chapters located in South East, South and Far East Asia will promote joint research activities in Asian Region. Homepage and newsletter will be set up and used to make communication easy.

This project will establish Asian School of Nuclear Medicine, which will give continuous education program for the nuclear physician, chemists, pharmacists, medical physicist and engineers for PET and cyclotron, radionuclide therapy and molecular nuclear medicine in conjunction with ARCCNM conference. Several training courses will be held in South Korea and China during the term of this project.

And this project will support trainees from the developing and underdeveloped Asian countries who want to study in China and South Korea. This project also support scientific visits of experts.

Through this project, many expert can learn PET related technologies, and many countries could be ready for clinical PET near future.

## 6. Proposed project duration

Four years: 2005-2006

## 7. Proposed work plan

Activity 1: Asian School of Nuclear Medicine - Lectures in connection with ARCCNM conference.

Activity 2: Transfer of PET and updated nuclear medicine related technologies through workshops, educations, scientific visits, training courses.

Activity 3: Support fellowship and scientific visits for trainees from the developing and underdeveloped Asian countries who want to study in developed countries.

Fellowship: Involved in PET or advanced technology in association with research and clinical activity for 3 months, mainly for young action scientists.

Scientific visit: mainly for faculty or training involved scientists for one week in order to get updated information.

The Institute of Radiation Medicine, Seoul National University (Director: Myung-Chul Lee, M.D.) will be responsible for these activities in association with ARCCNM function, which can be partly supported by Korean Government (Ministry of Science and Technology). For future action, two organizing committees or two task-force groups will be organized in the ARCCNM.

## 8. List of member states which have indicated their intention to participate in the Project

This project is open to all member states in Asia. Participants from Bangladesh, Pakistan, India, .... In developing and undeveloped countries are suggested to participate in this project.

## 9. The National Commitment

The involved member states are willing to cooperate with Agency and jointly implement this project with high national priority. Participating countries will nominate a national project coordinator and institute(s) to join this project, and provide support for the implementation of the project, such as manpower, facilities, operating cost of the project and host workshop, meeting and training course.

## 10. The Input sought from the Agency

<b>Activity</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
Project planning workshop Four days/12 participants	45,000			
Clinical PET Regional Training Course 15 participants/one week		50,000		
Training course on therapeutic radiopharmaceuticals and molecular nuclear medicine			45,000	
Asian School of Nuclear Medicine Lecture course	80,000	80,000	80,000	80,000
PET Technology transfer workshop	45,000	45,000	45,000	45,000
Fellowship 16 persons/three months	20,000	20,000	20,000	20,000
Scientific visit 16 persons/one week	10,000	10,000	10,000	10,000
Final project workshop				45,000
Publish manuals and guidelines				5,000
Subtotal	200,000	205,000	200,000	205,000
Total	810,000			