Role of IAEA in Promoting Nuclear Medicine

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Nuclear Medicine Section
Is the world's centre of cooperation in the nuclear field.

It was set up as the world's "Atoms for Peace" organization in 1957 within the United Nations family.

The Agency works with its Member States and multiple partners worldwide to promote safe, secure and peaceful use of nuclear technologies.

"Atoms for Peace" was the title of a speech delivered by U.S. President Dwight D. Eisenhower to the UN General Assembly in New York City on December 8, 1953.
• The IAEA mission is geared to a single, relatively new and controversial technology
  – Use as a weapon
  – Practical and useful tool (energy, health,)
• It was created in response to the deep fears and great expectations resulting from the discovery of nuclear energy
The following States are Members of the International Atomic Energy Agency:

AFGHANISTAN  AFGHANISTAN  AFGHANISTAN  AUSTRALIA  AUSTRIA  AZERBAIJAN  BANGLADESH  BELARUS  BELGIUM  BELIZE  BENIN  BOLIVIA  BOSNIA AND HERZEGOVINA  BOTSWANA  BRAZIL  BULGARIA  BURKINA FASO  CAMEROON  CANADA  CENTRAL AFRICAN REPUBLIC  CHAD  CHILE  CHINA  COLOMBIA  COSTA RICA  CÔTE D’IVOIRE  CROATIA  CUBA  CYPRUS  CZECH REPUBLIC  DEMOCRATIC REPUBLIC OF THE CONGO  DENMARK  DOMINICAN REPUBLIC  ECUADOR  EGYPT  EL SALVADOR  ERITREA  ESTONIA  ETHIOPIA  FINLAND  FRANCE  GABON  GEORGIA  GERMANY  GHANA  GREECE  GUATEMALA  HAITI  HOLY SEE  HONDURAS  HUNGARY  ICELAND  INDIA  INDONESIA  IRAN, ISLAMIC REPUBLIC OF  IRAQ  IRELAND  ISRAEL  ITALY  JAMAICA  JAPAN  JORDAN  KAZAKHSTAN  KENYA  KOREA, REPUBLIC OF  KUWAIT  KYRGYZSTAN  LATVIA  LEBANON  LIBERIA  LIBYAN ARAB JAMAHIRIYA  LIECHTENSTEIN  LITHUANIA  LUXEMBOURG  MADAGASCAR  MALAWI  MALAYSIA  MALI  MALTA  MARSHALL ISLANDS  MAURITANIA  MAURITIUS  MEXICO  MONACO  MONGOLIA  MONTENEGRO  MOROCCO  MOZAMBIQUE  MYANMAR  NAMIBIA  NEPAL  NETHERLANDS  NEW ZEALAND  NICARAGUA  NIGER  NIGERIA  NORWAY  PAKISTAN  PALAU  PANAMA  PARAGUAY  PERU  PHILIPPINES  POLAND  PORTUGAL  QATAR  REPUBLIC OF MOLDOVA  ROMANIA  RUSSIAN FEDERATION  SAUDI ARABIA  SENEGAL  SERBIA  SEYCHELLES  SIERRA LEONE  SINGAPORE  SLOVAKIA  SLOVENIA  SOUTH AFRICA  SPAIN  SRI LANKA  SUDAN  SWEDEN  SWITZERLAND  SYRIAN ARAB REPUBLIC  TAJIKISTAN  THAILAND  THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA  TUNISIA  TURKEY  UGANDA  UKRAINE  UNITED ARAB EMIRATES  UNITED KINGDOM OF  GREAT BRITAIN AND  NORTHERN IRELAND  UNITED REPUBLIC OF TANZANIA  UNITED STATES OF AMERICA  URUGUAY  UZBEKISTAN  VENEZUELA  VIETNAM  YEMEN  ZAMBIA  ZIMBABWE

The Agency's Statute was approved on 23 October 1956 by the Conference on the Statute of the IAEA held at United Nations Headquarters, New York; it entered into force on 29 July 1957. The Headquarters of the Agency are situated in Vienna. Its principal objective is “to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world”. 
IAEA Fundamentals

Secretariat
Vienna

Operational Liaison and regional
Monaco
Toronto
Tokyo
New York
Geneva

Scientific Laboratories
Vienna
Sibersdorf
Trieste
Monaco
Financial Resources

2010

Regular Budget
€315.5 million

Extrabudgetary Funds
€40.5 million

Technical Cooperation Funds
€139.1 million
What exactly does the IAEA do?

Three pillars:

- Science & technology
- Safety & security
- Safeguards & verification
What exactly does the IAEA do?

**Mission:** Maximizing the contribution of nuclear technology to society, while verifying its peaceful use

- Science & technology
- Safety & security
- Safeguards & verification
"I am trying to change the widespread perception of the Agency as simply the world’s ‘nuclear watchdog’ because it does not do justice to our extensive activities in other areas, especially in nuclear energy, nuclear applications, and technical cooperation.

Yukiya Amano
Director General
IAEA
Scientific Forum 2010
NUCLEAR APPLICATIONS IN HEALTH
A UNIQUE MANDATE OF THE UN SYSTEM

“The Agency shall seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world”

Article II of the Statutes of IAEA
Division of Human Health (NAHU)

- **Objective:** to enhance the capabilities in Member States to **address needs** related to the prevention, diagnosis and treatment of health problems through the **application of nuclear techniques:**
  - NMS (Nuclear Medicine and Diagnostic Imaging)
  - ARBR (Applied Radiobiology and Radiotherapy)
  - DMRP (Dosimetry and Medical Radiation Physics)
  - NAHRES (Nutritional and Health-related Environmental Studies)
Nuclear Medicine Section

**Mission:**
To enhance capabilities of Member States to address health needs by the use of nuclear medicine enhancing quality of practice.
The World Health Report 2008

Figure 1.8 The shift towards noncommunicable diseases and accidents as causes of death*

Deaths (millions)


- Road-traffic accidents
- Cerebrovascular diseases
- Ischaemic heart diseases
- Cancers
- Perinatal causes
- Acute respiratory infections
- Diarrhoeal diseases
- Malaria
- HIV/AIDS
- Tuberculosis

* Selected causes.
Priorities

• **Communicable Diseases:**
  – 32% of causes of death

• **Non-communicable diseases (68%)**
  – Cardiovascular diseases 29 %
    • Coronary Artery Disease 12,6%
  – Malignant Neoplasms 12,5%

Source: WHO World Health Report 2002
Problems to be addressed

• Technology advancing
• Increased pressure on NM community
• Lack of formal training
• Lack of opportunities for formal training
• Growing demand for trained professionals
NMS activities

1. Programmatic activities (Regular Budget)
   - Coordinated Research (CRPs)
   - Consultant Meetings/ Technical Meetings
   - International Symposia/Conferences
   - Educational Resources
     - Publications
     - Website

2. Support to the Technical Cooperation (TC) Program
Financial Resources

2010

- Regular Budget: €315.5 million
- Extrabudgetary Funds: €40.5 million
- Technical Cooperation Funds: €139.1 million
Coordinated Research

• Technology transfer (new procedures/techniques implemented)

• Share of knowledge (scientists from developed/developing countries working together)

• Contributes towards the greater understanding or solution of a specific issue or problem

• Contributes to the wider objectives which have been set for the relevant Agency Programme or Project
Programmatic Activities:
Four Strategic Areas

• Strengthen and widen the usage of Nuclear Medicine in cardiology
• Integrate functional imaging (SPECT/PET) in cancer management programs
• Support projects on therapeutic applications
• Improve Human resource capacity building:
  • physicians,
  • physicists, (with DMRP)
  • radiopharmacists/chemists, (with NAPC/IACS)
  • technologists
1. Improvement of secondary prevention in ischemic heart disease through strengthening the use of nuclear cardiology techniques

2. Clinical PET/CT, molecular imaging and multimodality approach in diagnosis and control of disease

3. Web based tools for education, databases and quality management for professional development

4. Cost-Effective Radiopharmaceuticals: Development and Clinical Use for Cancer Treatment

5. Molecular targeted radiopharmaceuticals for diagnosis and therapy in non-communicable diseases
Managing Chronic Diseases with Integrated Diagnostic Imaging Modalities emphasizing Cardiovascular Diseases and Cancer

- SOPs on the use of SPECT/CT in clinical practice
- Organize a Technical Meeting on Current role and trends of hybrid imaging and radioguided surgery
- CRP on Integrated imaging (SPECT/CT; PET/CT; MRI) in infection/inflammation and spine pathology
- CRP on Nuclear cardiology in congestive heart failure
- CRP on PET/CT for radiation treatment planning in cancer
- International Conference on Integrated Medical Imaging in Cancer and Cardiovascular Diseases
Cost-effective Use of Radiopharmaceuticals in Therapy, Neurology and Paediatric Diseases

- Prepare a document on role of nuclear medicine techniques in paediatrics
- CRP on therapeutic radiopharmaceuticals using Lu-177 and Y-90 for cancer management
- CRP on Radionuclide therapy in the treatment of non-Hodgkin's lymphoma

Quality Management in Professional Education and Clinical Practice

- Review and update the Nuclear Medicine Database (NUMDAB)
- Maintain NAHU web site for strengthening education of all professionals in nuclear medicine
Current CRPs

1. **Nuclear Cardiology:**
   i. Assessment of LVEF in CAD by G-SPECT
   ii. Rest MPI in acute chest pain
   iii. MPI in asymptomatic diabetes
   iv. Myocardial SPECT imaging and CTA in CAD

2. **Oncology:**
   i. FDG-PET in Lymphoma
   ii. Targeted radiolabelled peptides for the diagnosis and treatment of solid tumours
   iii. SLND in breast, melanoma and head & neck cancers
   iv. Lu-177 EDTMP for bone pain palliation in metastatic disease

3. **Others:**
   i. SPECT/CT in longitudinal follow up of complicated bone infections
Three specific programs within the Regular Budget

• Nuclear Medicine Database (NUMDAB)  
  http://nucmedicine.iaea.org

• Quality Management of Nuclear Medicine Practices (QUANUM)

• Human Health Website  
  http://humanhealth.iaea.org
Quality Management Audits in Nuclear Medicine Practices

Expected Outcomes

- Upgraded practices to international standards
- Improved skills of scientists and professionals in NM
- Improved premises and operational standards
The aim of NUMDAB is to gather and maintain updated information regarding the status of nuclear medicine practice around the world.

http://nucmmedicine.iaea.org
Human Health Website

Educational and Resources website for Health Professionals of: Nuclear Medicine, Radiation Oncology, Medical Physics and Nutrition.

http://humanhealth.iaea.org
After 100 years from the discovery of X-rays and half a century from the initial applications of radiotracers, nuclear medicine has become an integral part of medical practice. As the scope of imaging has broadened from anatomy to metabolism and function, and potential applications are increasingly expanding, virtually very few diagnoses can be made without the need of at least the simplest imaging procedure. Through case studies, guidelines, scientific papers and reports, the aim of this section is to keep the interested practitioners’ knowledge updated to latest developments on nuclear medicine practice.
The Technical Cooperation Program

- Technical Cooperation Program is aimed at knowledge and technology transfer to MSs

- Projects in Human Health accounts for more than 25% of the total TC budget

- Total budget allocated to support NM projects worldwide exceeds 3.5 Mil USD/year
Technical Cooperation Program

Nuclear Medicine:
currently 128 projects (7 regional)
Regional Projects 2009-11

• Africa:
  – Sustaining Clinical Nuclear Medicine Techniques in the Management of Diseases, Including Coronary Artery Disease

• Asia & Pacific:
  – Strengthening Clinical Applications of PET in RCA Member States
  – Strengthening and Standardizing Nuclear Medicine Applications in Cardiology in Asia through Education and Training

• Europe:
  – Improving Clinical Practice in Nuclear Medicine (Phase II)

• Latin America:
  – Improving management of cardiac diseases and cancer patients by strengthening nuclear medicine techniques in Latin America and Caribbean region.
  – Strengthening Quality Assurance in Nuclear Medicine
  – Creating a Latin America Network for Collaboration and Education in Nuclear Medicine
Technical Cooperation activity

• Training (the last 50 years):
  
  – Nearly **2248** fellowships/scientific visits awarded
    • **11448 months** (**950 years**)

  – **288 Regional/Interregional Training Courses** (typically 5 days each) on different topics related to NM in the last 20 years
    • in total **4758** participants
Technical Cooperation activity

• Procurement:
  – Nearly 50 new SPECT cameras provided to MSs in the last 10 years
  – Dose calibrators; Leaded hoods and treadmills
  – Generators and cold kits (LDCs)
The three pillars of a successful NM practice

- Infrastructure
- Manpower
- Equipment