Activities of the IAEA in Nuclear Medicine

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Outline

1. Who we are
2. How do we work
3. Challenges
4. Outreach
5. Technical Cooperation Program
The United Nations system

**SECURITY COUNCIL**
A permanent body responsible for keeping the peace and for international security.
- **Composition**: 15 members, of which 5 are permanent members with a right of veto: China, France, Russia, United Kingdom, United States.
- **Main objectives**: prevent war, resolve conflict.

**GENERAL ASSEMBLY**
Main deliberative organ.
- **Composition**: 193 members each with 1 vote.
- **Key functions**: debates, election of the Secretary-General, approval of the UN budget.

**ECONOMIC AND SOCIAL COUNCIL**
Main coordinating body for the main bodies of the United Nations and the specialized agencies in the economic, social, cultural, educational and health fields.
- **Composition**: 54 members elected by the General Assembly for 3-year terms.
- **Key functions**: oversees recommendations, programmes and projects.

**GENERAL SECRETARIAT**
Administrative body. Responsible for the implementation of the decisions made by the General Assembly and the Security Council.

**INTERNATIONAL COURT OF JUSTICE**
- **Composition**: 15 judges elected by the General Assembly and the Security Council for 9 years.
- **Key functions**: interpretation of treaties, settlement of legal disputes.

**TRUSTEESHIP COUNCIL**
Body responsible for supervising the administration of countries under trusteeship.
- **Composition**: the 5 permanent members of the Security Council and Member States elected by the General Assembly.

**SPECIALIST INSTITUTIONS**
There are many bodies linked to the Economic and Social Council which is coordinating international cooperation.
- **UNESCO**
- **FAO**
- **WFP**
- **UNFPA**
- **WTO**
- **WIPO**
- **UNIDO**
- **UNAIDS**
- **UNDP**
- **ILO**
- **UNHCR**
- **UN Women**

**INTERGOVERNMENTAL ORGANIZATIONS**
- **FAO**, International Fund for Agricultural Development.

**CAPTIONS**
- The six principal organs.
- Subsidiary bodies created by the principal organs and reporting to them.
- Because of its coordinating role in many areas, the Economic and Social Council also maintains relations with the various programmes and funds set up by the General Assembly.
- Principal actors in the United Nations organization.
The IAEA is an independent intergovernmental science and technology based organization within the United Nations family.

Serves as the global focal point for nuclear cooperation worldwide
The IAEA works with its 169 Member States and multiple partners worldwide to promote safe, secure and peaceful use of nuclear technologies
Through its work in Nuclear Sciences and Applications, the IAEA assists Member States in the context of social and economic goals through the planning and use of nuclear science and technology for various peaceful purposes.
How we are Organized?

Director General

Dept. Management
Dept. Safeguards
Dept. Nuclear Energy
Dept. Nuclear Safety
Dept. Nuclear Sciences & Applications
Dept. Technical Cooperation
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**:
Our role in the **Division of Human Health** is to strengthen the capabilities of MS to address the needs related to the prevention, diagnosis and treatment of health problems through the application of nuclear techniques.
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Programs tailored to the needs of our Member States

- Needs of the Member States
- UN Reports
- Advice from experts worldwide

Country Programme Frameworks (CPF's)
IAEA’s NUclear Medicine DAtaBase (NUMDAB)
Global Action Plan for prevention and control of NCDs - WHO

Maintain updated information regarding the status of nuclear medicine practice around the world

NUMDAB: http://nucmedicine.iaea.org
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Lights and Shadows
• Medical imaging technology has revolutionized health care over the past 30 years.

• Enables early diagnosis.

• Improves patient outcomes.

• Ranked by the New England Journal of Medicine as one of the top medical developments of the past millennium.
Shadows

- Difficult to cope with training needs of the involved multidisciplinary team of professionals (physicians, medical physicists, radiographers, radiochemists).
- Lack of proper assessment of the impact of introducing novel high cost health technologies and their sustainability.
- High cost, such as from equipment. Increased health cost (If not appropriately used)
- Equitable access for all patients in all countries, not limited to wealthy individuals and countries
- Difficulty to comply the international standards in particular in LMIC due to the lack of adequate infrastructure, machinery, quality assurance culture, qualified human resources
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Mission:

To enhance capabilities of Member States in Nuclear Medicine & Diagnostic Imaging through enhancing safety and quality of practice
Programmatic Activities:
Focus on two strategic areas

- Diagnosis and therapy of non-communicable diseases (NCDs) using nuclear techniques
- Educational resources for use of nuclear techniques in human health
Enhancing human health: 
**Four** major mechanism of support

- Service
- Quality
- Research
- Education
Service:

Well established function globally in providing technical guidance in the use of nuclear techniques
How do we work?
Section of NMDI

Counselling in all stages of implementation

01. Making the case
02. Planning Setting up
03. Safety Standards
04. Clinical Applications
05. Quality Management
06. Research
Quality:

- Quality is essential for effective delivery of health care,
- Goal is to assist our MS to improve the quality of the services they provide,
- **QUANUM project:** means to help MS to implement QM systems
  - Training professionals in QM
  - Quality check-list
  - Internal and external audits (EANM-EUMS)
  - Audit missions to MS - advise them on how to improve the quality of practice always considering the safety.

More than 50 audits in 20 countries
2016: revision and update

Research:
Benefits of CRPs

Way of bringing together researchers from both developing and industrialised countries to solve a problem of common interest.

• Participate in multinational research
• Improve routine clinical practice
• Provide answer to a relevant scientific question

Our research aims to expand knowledge and apply this knowledge to health service
Coordinated Research Projects: Current IAEA CRPs
Generating Evidence and Covering Knowledge Gasp

Cardiology:
- Nuclear Cardiology in Congestive Heart Failure - E13041
- Gated-SPECT in the Planning of Ischemia Guided PCI in STEMI Patients - E13045

Oncology:
- Enhancing capacity in early diagnosis and detection of breast cancer through imaging - E13039
- Standardizing Interpretation Criteria for Early Response Evaluation with 18f-FDG PET/CT in Paediatric Lymphoma - E12017
- Radiation Therapy Planning of Non-small cell lung cancer based on PET/CT. (Diagnostic component) – E13041
- PET/CT in the Evaluation of Locally Advanced Breast Cancer – E13044
- Use of PET–CT with Gallium-68 Labelled Prostate Specific Membrane Antigen in the Diagnosis and Follow-up of Patients with Prostate Cancer – E13046

Others:
- Integrated Imaging (SPECT/CT; PET/CT; MRI) in Infection/Inflammation Spine Pathology - E13040
- Use of 18F-FDG- PET/CT for imaging TB patients and related conditions (HIV/AIDS/TB) focus on drug resistant extra pulmonary TB - E15021
- Enhancing Capacity of Neuroimaging and Biomarkers: Application in Early-stage Alzheimer’s Disease with Comorbidities E13043
Coordinated Research Projects:
Generating Evidence and Covering Knowledge Gasp

Planned:

Gated SPECT in planning of ischemia guided PCI in STEMI patients
Comparison of Planar Multiple Gated Acquisition (MUGA) Scanning, Single Photon Emission Computed Tomography–MUGA and Echocardiography in the Evaluation of Chemotherapy Related Cardiotoxicity
Revascularization versus Medical Treatment for Ischemic Ventricular Dysfunction Trial (REMEDYS)

Recently completed:

Clinical use of myocardial SPECT imaging and CT angiography in coronary artery disease -E13038
Assessment of LVEF in CAD by G-SPECT
Rest MPI in acute chest pain
MPI in asymptomatic diabetes
Education:

Goal: to contribute to capacity building in NMDI through effective education and training programmes based on sound educational principles.

In order to develop competences in the professionals involved in the practice of NMDI through a lifelong learning process, we organize:

- Seminars and workshops
- International, regional conferences (RTC, …)
- Teaching materials
- Technical and scientific publications
- Online trainings
Distance Assisted Training (DATOL)  
Online for Nuclear Medicine Professionals

On-going for the last 15 years, mainly focus on the training of technologists.

Three year competency-based online program that has

>40 subjects delivered in 16 Modules, ~900 hours of study

Two parts

Part 1: basic science conventional nuclear medicine,
Part 2: SPECT, PET, CT and Cyclotrons

Certificate of achievement presented by professional societies, universities or hospitals (National recognition)

+ 800 trained technologists, + 25 countries
Online CT & PET/CT Training

• Cope with the training needs.
• Develop key competencies.
• Partnership with SNMMI - Lifelong learning program.
• 600 nuclear medicine physicians and radiologists in IAEA Member States worldwide.
• Review of 200 - CT and PET/CT Cases online
Human Health Campus

HHC:
5000 visitors per month

Cardiovascular
One of the most visited components of NM – over 1500 visitors per month

Goal: To support the MS with information for strengthening and improving the quality of practices through the use of CME Materials
Improving the learning experiences through eLearning
Development of interactive eLearning modules

Introduction of new interactive learning materials in the form of robust E-learning modules that enhance the self-directed learning experience.

Has the potential to improve efficiency in education and expand educational opportunities in remote areas.

A guide for hybrid imaging analysis

CT lymph node schematic approach Head and Neck, Thorax, Abdomen and Pelvis
Online Webinars

- On monthly basis
- 300 participants on average
- Devoted to: Nuclear cardiology
  - CT for hybrid imaging
  - General Nuc Med
- Available in English and Spanish
The ANSC2017 Live Streaming sessions are being sponsored by the International Atomic Energy Agency to physicians in developing countries.

This On Demand activity is comprised of sessions and presentations from the live ASNC2017 22nd Annual Scientific Meeting September 14-17, 2017 in Kansas City, MO. The focus of ANSC2017 meeting is to showcase current best practices, new ideas and emerging technology, radiation safety and appropriate use criteria in the nuclear cardiology clinical practice.

**Continuing education credits are not available for this content**
Scientific or Technical Publications

- Standard Operating Procedures for PET/CT - A practical approach for use in adult oncology
- Nuclear Cardiology: Guidance and Recommendations for Implementation in Developing Countries
- Practical Guidance on Peptide Receptor Radionuclide Therapy (PRRNT) in Neuroendocrine Tumours
- Appropriate use of FDG-PET for the Management of Cancer Patients
- Planning a Clinical PET Centre
- Quality Assurance for PET and PET/CT Systems
- A Guide to Clinical PET in Oncology: Improving Clinical Management of Cancer Patients
- Clinical Applications of SPECT/CT: New Hybrid Nuclear Medicine Imaging System
- The Role of PET/CT in Radiation Treatment Planning for Cancer Patient Treatment
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The Technical Cooperation Program

- Technical Cooperation Program is aimed at technology transfer to MSs
- Biannual cycle
- Proposals sent by MS
- Evaluated by TC and technical divisions
- Projects in Human Health accounts for more than 25% of the total TC budget
- Total budget allocated to support NMDI projects world-wide exceeds 3.5 Mil USD/year
Figure 1: Actuals by technical field for 2014.
Technical Cooperation projects:
Currently 60 national projects + 15 regional

New TC cycle (2018-2019)
Focus on – Hybrid Modalities PET/CT and SPECT/CT

• PET/CT has become the standard of practice in cancer management in the last decade
• Supporting activities and projects focused on implementing PET/CT: 1/3 of IAEA Member States have at least one PET centre and many others are in the planning phase.
• From 2014 to 2017: Seven projects in MS devoted to implementation of SPECT/CT.
• New emphasis in establishment of cyclotron facilities and/or or development of new 68-Ga PET radiopharmaceuticals.
Technical Cooperation activity

- Training (the last 50 years):
  - Nearly 2300 fellowships/scientific visits awarded
  - 11448 months (950 years)
  - Close to 290 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 60 new SPECT (and SPECT/CT) cameras provided to MSs in the last 10 years
  ➢ Dose calibrators; Lead-shielded hoods; synthesis modules and treadmills among others.
  ➢ Generators and cold kits (LDCs)
“An individual has not begun to live until he can rise above the narrow horizons of his particular individualistic concerns to the broader concerns of all humanity”.

Martin Luther King Jr.,
Civil rights activist
THANK YOU