

# Human Health

## Objective

*To enhance capabilities in Member States to address needs related to the prevention, diagnosis and treatment of health problems through the development and application of nuclear techniques within a framework of quality assurance.*

## Stable Isotope Techniques in Nutrition for Improved Health

One of the Agency's priorities is to build capacity in Member States in the use of stable isotope techniques for the evaluation of nutrition interventions. For example, through Agency support, the Kuwait Institute for Scientific Research acquired a highly trained body of staff and a laboratory equipped with an isotope ratio mass spectrometer and the ability to perform dual energy X ray absorptiometry. The laboratory is the only one in the Gulf Cooperation Council region with the capability to use stable isotope techniques, and the only one in the country that can perform assessments to evaluate the effectiveness of national intervention programmes aimed at reducing childhood obesity.

A United Nations task force was created in 2012 to help fulfil the commitments that form part of the 2011 Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases (NCDs). The Declaration calls on relevant United Nations system programmes, funds and agencies to work together in a coordinated manner to support national efforts against NCDs and to mitigate their impact. The Agency participated in the third meeting and hosted the fourth meeting of the UN Funds, Programmes and Agencies on the Implementation of the Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of NCDs. It also contributed comments on the Global Action Plan for the Prevention and Control of Non-communicable Diseases 2013–2020 to ensure that Agency support to health ministries in strengthening their capacities to use nuclear techniques in evaluating interventions on physical activity and healthy lifestyle is reflected fully in the final Global Action Plan (Fig. 1).

A publication issued in 2012 on the *Assessment of Iron Bioavailability in Humans Using Stable Iron Isotope Techniques* is an important part of the Agency's efforts

to transfer technology and to address micronutrient deficiency issues in Member States. It provides guidelines on how to use stable isotope techniques to assess the bioavailability of iron compounds as an important step in the development of food based strategies such as food fortification and food biofortification to combat iron deficiency anaemia.



FIG. 1. Children participating in an Agency supported regional project using stable isotope techniques to evaluate nutrition interventions against childhood obesity.

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## Nuclear Medicine and Diagnostic Imaging

As part of the QUANUM (Quality Assurance in Nuclear Medicine) programme, an interregional project was started in 2012 to offer auditing missions to all regions covered by the Agency's technical cooperation programme. The objective is to conduct quality assessments of nuclear medicine services, in accordance with the Agency's QUANUM guidelines. A quality management self-assessment questionnaire

was completed by the selected institutes and submitted before the visit by the external audit team.

## Quality Assurance and Metrology in Radiation Medicine

The role of computed tomography (CT) in modern medicine is well established as a means of diagnosis and also as an essential precursor to radiotherapy treatment. The complexity of this technology continues to increase, as does its potential to deliver substantial doses to patients. Consequently, the need for quality assurance to acquire the maximum clinical information at acceptable radiation dose levels is critical. The Agency issued a publication — *Quality Assurance Programme for Computed Tomography: Diagnostic and Therapy Applications* (IAEA Human Health Series No. 19) — that contains advice on both diagnostic and therapeutic applications of CT in recognition of the fact that in many facilities a CT scanner is used for both applications.

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FIG. 2. Comparison measurements of national dosimetry standards in X ray beams during a technical meeting at the Agency's Dosimetry Laboratory in Seibersdorf.

standards of Member States, harmonizing and linking radiation measurements to the International System of Units for radiotherapy, radiation protection and X ray diagnostic radiology. Since many Member States are in the process of establishing measurement and calibration capabilities in X ray diagnostic radiology, a technical meeting on 'Dosimetry and Comparisons in Diagnostic Radiology for Secondary Standards Dosimetry Laboratories (SSDLs)' was held at the Agency's Dosimetry Laboratory in Seibersdorf in November with the participation of several Member States. Comparison measurements were performed in the Agency's reference X ray diagnostic beams to verify the link of their national dosimetry standards to the international measurement system (Fig. 2).

## Applied Radiation Biology and Radiotherapy

A network of radiotherapy departments in Anglophone countries in Africa was established in 2012. The aim is to provide a forum for the professionals in radiotherapy centres in those countries who otherwise would have little opportunity to discuss cases, attend international meetings, or present challenging or unusual patient cases and benefit from the opinion of outside experts. The forum is expected to improve the quality of clinical decision making, thus contributing to radiotherapy treatments which are safer and more in line with internationally accepted standards (Fig. 3). Eight on-line meetings have taken place, during which diagnostic images, pathology slides and radiotherapy plans have been shared.

Biological dosimetry is a set of tools and techniques for assessing the health risk to the general public as well as to individuals who as a result of their work are exposed to radiation caused



FIG. 3. Image acquisition for radiotherapy planning.

by nuclear or radiation accidents. A network of 24 laboratories from around the world was established in 2012 to conduct research on biological dosimetry techniques. The research results can be applied in the assessment of human populations exposed, or potentially exposed, to radiation as a consequence of radiation accidents or malicious acts. The network made progress in establishing four major methods of contemporary biodosimetry and derived an in vitro dose response curve for all four methods. Some of the groups are performing innovative research to develop new methods using biodosimetry for adaptive response studies and the adoption of advanced statistical methods to improve the resolution of dose reconstructions.

### **Programme of Action for Cancer Therapy (PACT)**

With increasing demand for support from low and middle income (LMI) Member States, funding and resource mobilization continued to be a major focus for the Agency. In 2012, PACT received \$1.8 million in contributions and pledges from partner organizations and Member States. In addition, agreements were signed for the implementation of cancer control projects through PACT Model Demonstration Sites in Mongolia, Nicaragua and Vietnam.

The integrated missions of PACT (imPACT) reviews to address Member State requests for comprehensive cancer control capacity and needs assessment require a high level of coordination with external partners such as WHO, the International Agency for Research on Cancer and the Union for International Cancer Control. The establishment of an internal PACT Working Group in December 2012 and completion of the imPACT process review are expected to strengthen imPACT reviews and ensure timely, efficient and comprehensive delivery of this

important Agency service to Member States. By the end of 2012, 13 Member States had received imPACT missions. This brought to 47 the number of Member States who have received an imPACT mission since the creation of PACT.

The Advisory Group on Increasing Access to Radiotherapy Technology in LMI countries

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(AGaRT) entered its third year in 2012, and continued to bring together users in LMI countries and major radiotherapy equipment suppliers. During the annual AGaRT meeting in June 2012, discussions focused on the development of radiotherapy equipment packages for low resource settings. AGaRT members agreed to develop basic, intermediate and advanced level radiotherapy equipment based upon the specific conditions of the four geographical regions represented in AGaRT.

The Virtual University for Cancer Control and Regional Training Network (VUCCnet) Africa initiative also entered its third year in 2012. The participating Member States include Egypt, Ghana, South Africa, Uganda, the United Republic of Tanzania and Zambia, as well as donors such as the Roche African Research Foundation and the USA, among others. In addition to courses on cervical cancer, two e-learning courses on palliative care and cancer care skills for community health workers are being developed.