

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.

Quality Management in Nuclear Medicine

In 2008, the Agency introduced guidelines on quality management in nuclear medicine to facilitate self-appraisal and external audits. The *International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources*, as well as the Agency's assistance in the area of nuclear medicine, require that radiation medicine centres establish a comprehensive quality assurance programme for medical exposures supported by internal and external audits. The objective of these guidelines is to introduce a culture of annual systematic reviews of the clinical area. The Agency tested these guidelines in a technical cooperation project in Slovenia. Quality management self-assessments have now been adopted by the European Union of Medical Specialists/European Board of Nuclear Medicine for the certification of nuclear medicine processes in nuclear medicine departments.

The quality, safety and efficacy of radiopharmaceuticals are a concern of a large number of States, many of which do not have the means to develop their own quality specifications. To address this issue, the Agency and WHO validated a new chapter of the *International Pharmacopoeia (Ph. Int.)* on radiopharmaceuticals. The approval of this chapter followed four years of collaboration between the Agency and WHO, and is the result of lengthy and detailed reviews by all stakeholders, including numerous WHO

collaborating centres and national quality control laboratories.

Capacity Building in Radiation Oncology

Using its Directory of Radiotherapy Centres (DIRAC) – the only global database that describes the current capacity for the delivery of radiation therapy – the Agency provided data to the European Union Network for Information on Cancer. In addition to helping set up a network of databases, the Agency provided the European Union with updated and standardized indicators on cancer burden and care, ensuring the availability of data on cancer in Europe through traditional publications as well as through electronic media.

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achieving this goal is by providing targeted education and training. For example, in 2008 the Agency and the European Society for Therapeutic Radiology and Oncology conducted a pilot training course on best practices in radiation oncology. Selected groups from eight European countries received instruction on how to create their own train the trainers courses for radiation therapy technologists (RTTs) in their respective countries.

The shortage of medical specialists for cancer treatment in developing countries was the driving force behind a new distance learning course launched in 2008 entitled Applied Sciences of Oncology (<http://rpop.iaea.org/RPoP/RPoP/Content/index.htm>). Intended for radiation oncologists, RTTs, medical physicists and radiation biologists, this course can be used as either a self-guided or a tutored programme, complementing the training available in their countries through formal educational programmes. In addition, a new syllabus for the training of radiation oncology nurses was published in the Agency's Training

Course Series, to help Member States establish training programmes in this field.

Quality Assurance and Metrology in Radiation Medicine

Recognizing that both the clinical aspects (diagnosis, treatment decision making, indication for treatment and follow-up) and the procedures related to the physical and technical aspects of patient treatment require careful control and planning to ensure safe, high quality radiotherapy, the Agency published guidelines on *Setting up a Radiotherapy Programme: Clinical, Medical Physics, Radiation Protection and Safety Aspects*. This was complemented by the issue of two other publications on the effective implementation of advanced treatment modalities, such as three dimensional conformal radiotherapy and intensity modulated radiotherapy.

The Agency also trained some 100 medical physicists in the use of these technologies, mainly through technical cooperation workshops and courses, and through partnerships with the ICTP, the American Association of Physicists in Medicine and the European Federation of Organisations for Medical Physics.

Coordinated research activities on radioactivity measurements for nuclear medicine applications concluded in 2008 and are expected to lead to improvements in the accuracy with which radiopharmaceuticals are determined before they are administered to patients. This is particularly important for therapeutic nuclear medicine, where unsealed sources with relatively high activity levels are used to treat rather than diagnose disease.

In the framework of its Quality Assurance Team for Radiation Oncology (QUATRO) service, the Agency implemented a methodology for comprehensive audits of radiotherapy practices in 25 Member States in Asia, Europe and Latin America, mainly through technical cooperation projects. The Agency communicated its recommendations for improvements in radiotherapy treatment to the audited hospitals.

A similar external clinical audit programme was formulated in the area of diagnostic radiology. Two pilot audits using the new guidelines, known as Quality Assurance Audit for Diagnostic Radiology Improvement and Learning (QUAADRIL), were

implemented in 2008. This audit process reviews the complete clinical range of activities in diagnostic radiology facilities by providing a framework for a structured investigation, a description of acceptable standards, and a format for documenting the status of the audited site. In related work, an audit using QUAADRIL was conducted through a technical cooperation project in a radiology department in Bosnia and Herzegovina. The objective was to evaluate the quality of this department's practices and overall performance in diagnostic radiology, as well as in interactions with external service providers.

The IAEA-WHO thermoluminescent dosimeter (TLD) postal dose audit service focuses on providing dose quality audits to end users, who often have no other means to verify the output of their radiation sources. It provides quality assurance to health professionals and patients, and seeks to improve the quality of treatment. In 2008, the service checked the calibration of 458 clinical beams used to treat cancer

patients in Member State hospitals. Twenty-five discrepancies were identified and resolved.

The Agency's dosimetry standards have been used to calibrate 20

national standards from Member States, providing a link from their measurements to the international measurement system (Fig. 1). Once established, these standards are used by national dosimetry laboratories to calibrate instruments used in radiotherapy, diagnostic radiology and radiation protection dosimetry. The international dosimetry comparisons, published in 2008 by the International Bureau of Weights and Measures (BIPM), investigated the degree of equivalence of internationally recognized dosimetry standards, and confirmed the quality of the Agency's dosimetry standards.

Stable Isotope Techniques to Improve Nutrition and Address Communicable Diseases

The Agency's collaboration with WHO and other partners was further strengthened during 2008 through the organization of joint meetings on priority areas in nutrition, including HIV/AIDS. A regional consultation meeting, sponsored jointly by WHO, the US National Institutes of Health, the Agency and other partners, was held in Burkina Faso for 20 francophone African countries. The

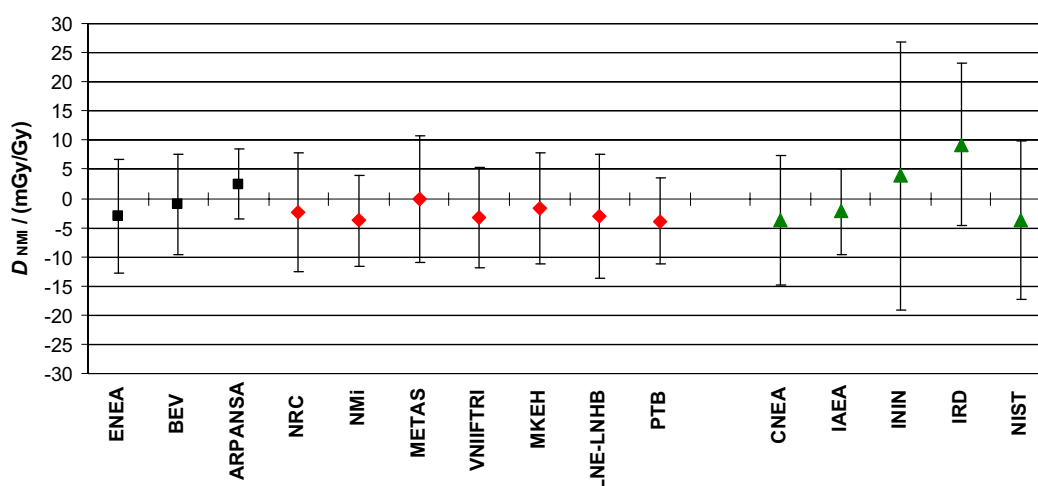


FIG. 1. An international dosimetry comparison showing the degree of equivalence between national dosimetry standards (x axis) with respect to the BIPM reference value (y axis). (The black squares indicate results that are more than ten years old.)

meeting was notable for being the first time that the Agency has been involved in the organization of a regional meeting on this issue and resulted in recommendations to integrate nutrition into a comprehensive response to HIV/AIDS in African countries.

Collaboration with HarvestPlus (a programme of the Consultative Group on International Agricultural Research (CGIAR)) in 2008 included research activities on biofortification as a strategy to improve micronutrient nutrition for infants and young children. A joint technical meeting, organized to review progress in plant breeding to improve the nutritional quality of staple foods in developing countries, concluded that major achievements had been made to establish biofortification as one of the most important sustainable strategies to combat micronutrient malnutrition, also known as 'the hidden hunger' (Fig. 2).

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New research activities, as well as the Agency's support to the International Malnutrition Task Force (IMTF), are prominent indicators of the Agency's increased attention to the problem of severe acute malnutrition in children. As a member of the IMTF board of governors, the Agency worked with the International Pediatric Association, the International Union of Nutritional Sciences, UNICEF and WHO to provide leadership and direction to this interagency advisory and advocacy group. As one of its first major activities, the IMTF launched a web

site in 2008 to share ideas and experience on the management of acute malnutrition.

In the area of communicable diseases, activities conducted under Agency projects validated new diagnostic tools for national disease control and surveillance programmes. The objective is to counter the spread of drug resistant strains of pathogens of epidemiological significance, and to help integrate these tools into the protocols of national control programmes for malaria and TB.

The Agency's technical cooperation projects contributed to the upgrading of laboratory facilities, capacity building, and the establishment or strengthening of molecular capacity in Burkina Faso, Cameroon, Ethiopia, Ghana, Kenya, Madagascar, Mali, Nigeria, South Africa, Sudan, Uganda, the United Republic of Tanzania and Zambia. These molecular techniques were central to the identification and control

of outbreaks of multidrug resistant TB (MDR-TB), and to the detection and monitoring of emerging MDR-TB strains. Results from the studies were used in national policies and strategies to combat malaria.

Programme of Action for Cancer Therapy (PACT)

During 2008, the Agency continued to build partnerships through PACT with leading cancer organizations and agencies. In this regard, an agreement with WHO for a Joint Programme on Cancer Control



FIG. 2. A study in Bangladesh is evaluating the impact of replacing white sweet potatoes with orange sweet potatoes with high provitamin A carotenoid content (biofortified sweet potatoes) to combat vitamin A deficiency (photograph courtesy of K. Jamil, ICDDR,B, Dhaka, Bangladesh).

was finalized during the year. 'Practical Arrangements' were also concluded with the International Agency for Research on Cancer (IARC), the Program for Appropriate Technology in Health (PATH) and the Organisation of European Cancer Institutes–European Economic Interest Grouping (OECE–EEIG). Negotiations for three additional partnership agreements were initiated with the Lance Armstrong Foundation, the Alliance for Cervical Cancer Prevention and Best Medical International.

The Agency made significant progress in building up PACT Model Demonstration Sites (PMDSs) in Albania, Nicaragua, Sri Lanka, the United Republic of Tanzania, Vietnam and Yemen. For example, radiotherapy machines were installed in Nicaragua and the United Republic of Tanzania and, within the framework of a tripartite agreement concluded in 2008, India will supply a 'Bhabhatron' teletherapy machine to Vietnam. In

addition, by the end of 2008, PACT had received requests from 60 Member States for impACT reviews since its implementation in 2006.

More than 20 Member States volunteered their national cancer institutes, cancer centres and hospitals as training resources for PACT programme initiatives in 2008. For example, the Tata Memorial Centre and the Bhabha Atomic Research Centre in India designed a comprehensive training programme offering fellowships in radiation oncology and medical physics, including practical training opportunities, for health professionals from PMDS countries and Africa. And using funds from the IAEA Nobel Peace Prize Cancer and Nutrition Fund, PACT helped train 20 participants from Africa and Latin America in quality assurance procedures in radiotherapy at the Argonne National Laboratory in the USA.

With in-kind support valued at more than \$250 000 from the US National Cancer Institute (NCI), 22 health professionals from low and middle income Member States, including 12 from PMDSs, completed the NCI summer curriculum in cancer prevention in the USA. The Agency also supported the participation of seven individuals from PMDS countries in a training course in France on cancer registration and epidemiology organized by the IARC; and three Tanzanian health professionals were awarded medical physics fellowships to study in South Africa. Finally, using resources mobilized by PACT, the Agency helped train over 70 health professionals to strengthen capacity in cancer control and radiotherapy in several developing countries.

Culminating a two year Agency effort, \$13.5 million in long term loans were confirmed in 2008 by the OPEC Fund for International Development and the Arab Bank for Economic Development in Africa to strengthen Ghana's national cancer control programme. In addition, PMDS counterparts in

Vietnam credited PACT initiatives with facilitating bilateral support by Australia and Austria to train up to 30 professionals and provide up to six radiotherapy machines. In December 2008, HSH Prince Albert II of Monaco hosted a gala dinner in Monte Carlo to generate support for PACT programme activities.

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