

Human Health

Objective

To enhance the 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.

Nuclear Techniques in Nutrition

During 2007, the Agency strengthened its collaboration with WHO, UNICEF and other partners in priority areas in nutrition, with special emphasis on nutrition and HIV/AIDS. The Agency hosted a steering committee meeting for a regional consultative meeting in October in Bangkok aimed at providing technical guidance to incorporate HIV/AIDS into national nutrition policies and programmes.

The complex interactions between poor nutrition and infectious diseases are highlighted by a new regional technical cooperation project in West Africa on the effect of improved micronutrient nutrition (vitamin A and zinc) on malaria in young children. Capacity building and training in the use of nuclear techniques in nutrition are major components of this project. In this regard, the Agency's contribution to capacity building in nutrition in Africa was recognized during the first meeting of the Federation of the African Nutrition Societies, held in May in Morocco.

Infants and young children are particularly vulnerable to the devastating effects of poor nutrition, as demonstrated by recent estimates that 99% of all child deaths occur in low and middle income countries, with poor nutrition being a significant factor in more than half of these deaths. A major aim of the IAEA Nobel Peace Prize Cancer and Nutrition Fund 'School for Nutrition', held in April in Dhaka, Bangladesh, was to discuss with nutritionists and other health professionals in the Asia-Pacific region the usefulness of stable isotope techniques in the development of effective interventions to combat undernutrition in infants and young children.

Stable isotope techniques were also part of new national technical cooperation projects focusing

on infant and young child nutrition. For instance, the Agency supported projects to assess human milk intake in breastfed infants over a period of several years. Highlighting significant progress in this important area, the Agency held a technical meeting in November to review available data and to identify priority areas for future applications in the development and/or evaluation of nutritional interventions.

Nuclear Medicine and Diagnostic Imaging

New nuclear medicine procedures have been developed that can diagnose diseases non-invasively — providing information that cannot be acquired with other imaging technologies — and can deliver targeted treatments.

Overall, the use of nuclear medicine procedures is expanding rapidly, especially as new imaging technologies, such as positron emission tomography/computed tomography (PET/CT) and single photon emission computed tomography/computed tomography (SPECT/CT) continue to improve the accuracy of detection, localization and characterization of disease.

The Agency's first international conference on clinical PET and molecular nuclear medicine, which was held in Bangkok in November, drew nearly 400 delegates from 82 Member States. This event focused on the dynamics and recent advances in the area of PET tracers and their clinical applications. The short half-lives of most radioisotopes used in PET make it essential that the process is automated, from irradiation to the dispensing stage, so that the final radiopharmaceuticals are in compliance with the approved guidelines of good manufacturing practices. The participants of the conference reaffirmed the need to evolve appropriate guidelines for short shelf-life radiopharmaceuticals. The issue of expanding PET/CT to the developing world was also raised as one of the priorities, further reinforcing the need to promote nuclear medicine in public health care systems, and establishing human resources capacity. The conference reflected a growing trend within the medical community to find integrated global solutions to health related challenges.

“Overall, the use of nuclear medicine procedures is expanding rapidly, ...”

The Agency facilitated research in 2007 into childhood cancers through a CRP on improvements in the treatment of acute lymphoblast leukaemia (ALL). As part of the CRP, 241 children from India, Myanmar, Pakistan and Sudan were tested, and four common specific fusion genes were identified, adding weight to the hypothesis that ‘good prognosis’ leukaemia is associated with delayed infection exposure in childhood. Good prognosis refers to the patterns of genetic activity in this cancer, which can predict the long term survival of a patient. This points to public health measures that can be realistically put into place to ease the scourge of the most common cancer among children

“The Agency facilitated research in 2007 into childhood cancers ...”

Radiation Oncology and Cancer Treatment

An important result of the European Union Network for Information on Cancer (EUNICE) steering committee meeting in Lyon in January 2007 was that 90% of the European data in the Agency’s Directory of Radiotherapy Centres (DIRAC) was updated. The Agency continued to strengthen its collaboration with ESTRO, supporting 75 participants from central and eastern Europe at ESTRO training courses in 2007. Another noteworthy initiative was the decision by the Ministers of

Health of Central America – Belize, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua and Panama – at their 2007 annual meeting to approve a subregional cancer control programme with the assistance of the Agency, PAHO and WHO.

A prospective randomized trial comparing high dose rate (HDR) brachytherapy alone versus HDR brachytherapy with external radiotherapy for the palliation of dysphagia in advanced oesophageal cancer was completed. The results of this Agency study showed that there was an advantage to using the combined modality treatment in terms of dysphagia relief and quality of life. The results of this study were presented at the meeting of the European Cancer Organization in Barcelona and at the American Society for Therapeutic Radiology and Oncology Annual Meeting in Los Angeles.

The Agency, through a number of technical cooperation projects in Latin America, supported the introduction of new technologies such as PET in radiotherapy, mainly by training local staff and by expert missions. A highlight was the assistance provided to Nicaragua to adopt HDR brachytherapy for improving cancer care, to continue to improve radiotherapy with the support of the Programme of Action for Cancer Therapy (PACT) (Fig. 1) and to develop nuclear medicine services.



FIG. 1. PACT support for radiotherapy in Nicaragua.

Quality Assurance and Metrology in Radiation Medicine

A new International Code of Practice, *Dosimetry in Diagnostic Radiology* (Technical Reports Series No. 457), was published in 2007. The report emphasizes the practical aspects of calibration at the IAEA/WHO secondary standard, dosimetry laboratories and during measurements in clinical practice. The code of practice will help to achieve and maintain a high level of quality in diagnostic radiology dosimetry, to improve the implementation of traceable standards at the national level, and to ensure better control of radiation dose in X ray medical imaging worldwide.

At the Agency's Laboratories, Seibersdorf, a new gamma camera laboratory was inaugurated in May. In a training course held in June, medical physicists received hands-on training in gamma camera acceptance and other quality control tests. A regional dosimetry comparison exercise was held

"Through a regional technical cooperation project in Latin America, 24 hospitals received equipment for the positioning and immobilization of patients, ..."

in May with the participation of five representatives of national calibration laboratories in Africa. The exercise identified the main reasons for important deviations detected during a dosimetry comparison in Africa carried out in 2003.

Upgrading of the dosimetry laboratory facilities included the commissioning of a new cobalt-60 unit and the installation of a new diagnostic X ray irradiator in 2007. As a result of these upgrades, the

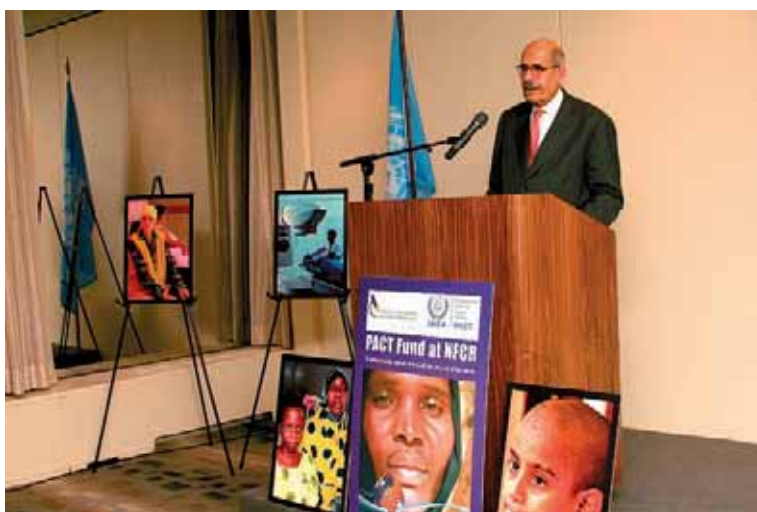
capacity of the Agency's Laboratories for dosimetry services to Member States was enhanced. In particular, standardization of radiation dosimetry

in diagnostic radiology was strengthened with the new equipment that complies with the new international code of practice for dosimetry in X ray diagnostic radiology.

Health services in Mexico were strengthened through a national technical cooperation project that focused on medical physics resources. Laboratory equipment, together with expert advice provided through the project, supported the medical physics

SECURING ADEQUATE FUNDING FOR PACT

By the end of 2007, PACT had secured donations exceeding \$530 000, with additional pledges and pending grants in excess of \$440 000, bringing funds raised by PACT since its inception to over \$3 million. Meanwhile, the establishment of an endowment fund — the 'PACT Fund at NCFR' — by the National Foundation for Cancer Research will facilitate the support of PACT initiatives by US based individual and institutional donors. In this connection, a fund raising effort was launched with a reception at United Nations Headquarters in New York in October, which was attended by more than 80 leading cancer experts, activists and philanthropists.



The Director General addressing the PACT Fund at the NCFR reception in New York.

graduate programme of the Universidad Nacional Autónoma de México, resulting in new and better equipped practical activities for students. During the two year project that ended in 2007, 16 students completed their advanced degree. Twelve of these graduates now work as clinical medical physicists in Mexican radiotherapy, nuclear medicine and magnetic resonance health services, and two are pursuing doctoral degrees in a related field.

Through a regional technical cooperation project in Latin America, 24 hospitals received equipment for the positioning and immobilization of patients, and in each of the participating countries some centres have been provided with updated reference material and guidance on the physics aspects of radiotherapy. The project focused on quality assurance in radiation therapy, machine calibration and the calculation of patient dose.

Programme of Action for Cancer Therapy

During 2007, Agency collaboration with the International Agency for Research on Cancer (IARC), the International Network for Cancer Treatment and Research (INCTR), the International Union against Cancer (UICC), WHO and national cancer institutes and centres in Algeria, Argentina, Brazil, Egypt, France, India, Morocco, the Philippines, South Africa, Thailand and the USA expanded through 'imPACT' reviews, the development of PACT Model Demonstration Sites (PMDs), regional initiatives and events.

The Agency formalized relationships with several key international partners, signing 'PACT Practical Arrangements' with UICC, INCTR and

the US health consultancy Axios. More than 20 Member States offered to collaborate with PACT, with cancer treatment institutions making their hospitals and educational centres available to support PACT initiatives. This will assist the PMDs as well as regional training and mentoring projects. PACT worked with steering committees established by health ministries in the six PMDs (Albania, Nicaragua, Sri Lanka, the United Republic of Tanzania, Vietnam and Yemen) to finalize national cancer control strategies and develop national action plans for the future implementation of comprehensive cancer control programmes. In addition, follow-up imPACT missions to five PMD countries were conducted in 2007.

Training modules on comprehensive cancer control, radiation oncology, emerging techniques in radiotherapy planning and delivery, research, education and training were conducted in Buenos Aires in April, during the third IAEA Nobel Peace Prize Cancer and Nutrition Fund Special Event on Cancer. The Nobel Fund also supported training on quality assurance in radiotherapy for 16 participants from Africa at the Argonne National Laboratory in the USA.

Through PACT, the Agency supported the following training activities in 2007 for PMDs and other Member State health professionals: the US National Cancer Institute (cancer prevention); the IARC (cancer registration and epidemiology); and the INCTR (assessing national cancer care needs and developing thematic strategies on palliative care). Through donations and in-kind assistance, PACT obtained support for individual training in radiation oncology, medical physics and radiation therapy technology in Canada and South Africa.