Human Health
Improving Health Around the World

Building Capacity in Nuclear Medicine and Diagnostic Imaging

Every year, millions of nuclear medical examinations are conducted around the world using radiopharmaceuticals that assess diseases at molecular levels. Diagnostic images are then generated to help diagnose and treat major disorders and illnesses such as heart disease and cancer.

Positron emission tomography in oncology and single photon emission tomography in cardiology (as well as in other areas) provide unique functional information that, when combined with anatomical data obtained by magnetic resonance imaging or computed tomography, allow for more precise localization of cancer or cardiac abnormalities. By facilitating appropriate human resources capacity building, the IAEA helps to establish new, and improve existing, nuclear medicine facilities, and encourages nuclear medicine imaging integration with diagnostic radiology procedures, thus helping its Member States to achieve and maintain high standards of professional practice.

Promoting Radiation Oncology for Cancer Treatment

By 2020, up to 15 million people worldwide will be diagnosed with cancer every year, with 70% of these new cases occurring in the developing world. Radiotherapy is an essential component in the treatment of cancer for both cure and palliation. It has also been proven to be a cost effective modality. To address the shortage of cancer treatment resources in low to middle income countries, the IAEA provides expertise in radiation oncology and works with a variety of stakeholders, including other organizations within the United Nations, hospitals, governments and research institutes. In addition, in order to achieve the optimal use of radiotherapy, this modality must be part of a comprehensive cancer control programme that also includes effective prevention and early detection measures. In this context, the IAEA works to promote effective and safe radiotherapy services in Member States.

The IAEA also promotes and coordinates research in clinical radiation oncology and applied radiation biology. Technical expertise in these fields is provided through technical cooperation projects, which directly address cancer management in many countries around the world.
The objective of the IAEA in the area of radiation oncology is to enhance Member States’ capabilities to establish sound policies for radiotherapy and cancer treatment, and to ensure the effective, efficient and safe utilization of current and future advances in radiotherapy. Member States receive assistance in modernizing and establishing new radiotherapy facilities, brachytherapy services, new technologies and education programmes.

Ensuring High Quality Dosimetry and Medical Radiation Physics

Medical procedures utilizing radiation play a central role in modern health care. To ensure maximum benefits and minimal risks, it is essential that these techniques rely on adequate dosimetry (i.e. dose measurement) and medical physics procedures.

In therapeutic procedures, accurate dose measurement and delivery are critical for effectively treating patients. In diagnostic imaging, quality assurance processes enable accurate image generation with minimal radiation dose to patients and medical personnel. The IAEA contributes to ensuring the safe and effective use of radiation in medicine through its activities in dosimetry and medical radiation physics. Through the IAEA–WHO network of secondary standards dosimetry laboratories traceable dosimetry calibrations services are provided. Independent dosimetry audits for radiotherapy centres are conducted in conjunction with WHO and comprehensive clinical audits are offered by the IAEA to radiation medicine facilities around the world.

One ongoing project aims at developing, in collaboration with professional societies, guidelines on the dosimetry of small and composite fields used in novel radiotherapy techniques. These guidelines are needed to ensure standardization and harmonization of dosimetry practices and will contribute to the safe and effective implementation of new radiotherapy treatment modalities worldwide.

Fighting Malnutrition with Nuclear Techniques

One out of every ten children born in developing countries will die before their fifth birthday as the result of malnutrition. In total, about ten million children die each year. This extremely high death toll demonstrates the vulnerability of infants and young children to poor nutrition and health. Fighting malnutrition is a key part of the IAEA’s agenda in its efforts to contribute to Millennium Development Goal #4 to reduce the mortality rate among children under five years of age by two thirds.

The IAEA assists Member States in their efforts to develop effective, evidence based interventions to combat malnutrition using stable (non-radioactive) isotope techniques. For example, as recommended by the WHO and UNICEF, exclusive breastfeeding during the first six months of life is vitally important for a child to begin a healthy life.

Tackling Infant Malnutrition with Stable Isotope Techniques

By using a stable isotope technique in which the mother is given a dose of deuterium oxide, data can be generated on the total volume of human milk consumed by the baby over a period of fourteen days, as well as information gathered on whether the baby was exclusively breastfed or not.

For the first time ever, this methodology is being used in fifteen African countries to collect a large data set on human milk intake and the prevalence of exclusive breastfeeding.

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