Moreover, in addition to promoting the efficiency and transfer of radionuclide therapies, the project provided the groundwork for some Government Parties to establish the facilities and infrastructures required for the execution of radionuclide therapies, such as a hot lab or isolation walls, by securing financial commitments from the local governments and global agencies.

Indisputably, these two projects played a key role in strengthening the effective use of advanced nuclear technologies by nuclear medicine professionals in the management of NCDs. This has significantly raised the overall quality of patient care in the region. The improved awareness of nuclear medicine technologies has facilitated the acquisition of key medical equipment by the Government Parties, with technical and financial support from the relevant authorities. Allayment of the general misconception about their safety has led to an increased number of nuclear medicine techniques applications. Moreover, multidisciplinary cooperation among medical professionals of various specialties were amplified in the provision of accurate diagnosis and treatment to patients. The contribution of these projects to the development of nuclear medicine in the Asia Pacific region is expected to bring new hopes and opportunities to the patients suffering from NCDs thereby improving human health overall.




Radionuclide Therapy

Conventional radiation treatment of cancer patients employs external radiotherapy with ionizing radiation such as X-rays. More recently, radionuclide-based therapies have been developed to treat certain types of cancer in a more precise and safer way. Also known as **targeted radionuclide therapies**, these therapeutic strategies involve radioactive drugs, or radiopharmaceuticals, which travel through the patient's bloodstream to specific tumours, for instance thyroid, lymphomas and bone metastases, delivering radiation that destroy the cancer cells. These radionuclides suited for this tumour therapy emit ionizing radiation with short penetration, such as α (alpha) or β (beta), thus limiting radiation exposure to healthy tissues and minimizing the side effects for patients.

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RCA Success Story 2020 Edition

Improving Human Health Using Nuclear Medicine Technology and Radionuclide Therapy

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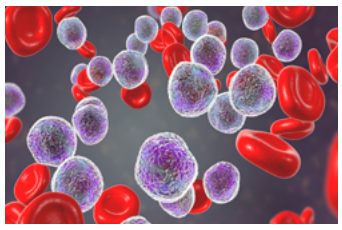
Improving Human Health Using Nuclear Medicine Technology and Radionuclide Therapy



Non-communicable diseases (NCDs) are by far the leading cause of death around the world, accounting for 63% of all the annual deaths according to the World Health Organisation (WHO). The most common and fatal NCDs include cardiovascular diseases such as heart attacks, stroke, cancer and chronic respiratory diseases. The United Nations (UN) aims to reduce premature mortality from NCDs by a third by 2030 through timely prevention and appropriate treatment. Early detection of diseases is important for timely prevention and appropriate treatment as it enables physicians to recognize the symptoms before the disease progress to the advanced stages, making it harder to treat. Nuclear Medicine has been regarded to be highly effective in diagnosing and treating diseases from an early stage through the application of radioactive substances, or radiopharmaceuticals. Currently, the Positron Emission Tomography (PET) or the Single Photon Emission Computed Tomography (SPECT) are widely employed for nuclear medicine imaging. After a minute amount of radiopharmaceuticals is introduced into a patient's body, the gamma camera system in the equipment traces and capture the migration of the radioactive substance, providing functional and metabolic information of the targeted organ to the physicians. This technology allows nuclear medicine professionals to more accurately and safely diagnose and treat the diseases compared to conventional techniques.

Despite the advancement of nuclear medicine and the growing number of related installations in the Asia Pacific region, this modern technology was under-utilized and not readily available due to the high associated cost and limited available expertise. Moreover, the general misconception about radiation exposure and strict regulations hindered the development of nuclear medicine in the region. To address these problems, two RCA projects – RAS/6/083 and RAS/6/071 – were implemented to help bring change in the field of nuclear medicine of the participating Government Parties with coherent but different targets and objectives.

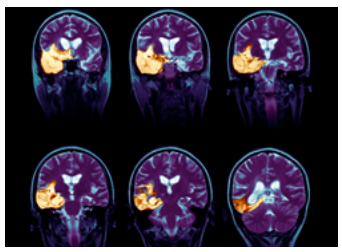
The RCA project RAS/6/083, "Improving Patient Care and Enhancing Government Parties Capacity in Nuclear Medicine Programmes in RCA Region," was carried out for 3 years starting from 2016, with the objective of improving patient care in NCDs in Asia and the Pacific region through transfer and promotion of nuclear medicine imaging technology. In spite of the large increment of the patients suffering from NCDs such as cancer, they were impeded from taking full advantage of the necessary technology due to lack of well-trained personnel and underestimation of its important role in **early detection of the diseases**. Hence, various modalities of activities were conducted to enhance the physicians' ability to utilize nuclear medicine techniques as well as to raise awareness of their efficiency by educating personnel in both nuclear medicine and non-nuclear medicine fields during the project.

In particular, expert missions were implemented in different countries, tailored to their respective needs and challenges, many of which included raising awareness of advanced nuclear medicine technologies. For instance, the introduction of PET heightened interactions between nuclear medicine experts and referring physicians towards a multidisciplinary approach to complex clinical issues in Indonesia, Myanmar and the Philippines. In Pakistan, effective use of radionuclides in thyroid management was welcomed by professionals from different fields such as endocrinologists, whilst the application of nuclear medicines using PET and SPECT to brain diseases substantially increased in Malaysia and Thailand. Improvement of the perception of medical doctors and the public on radiation safety of nuclear medicine techniques were achieved through similar activities in China, as well as through the mass media in Bangladesh.

TV interview with RCA experts in Bangladesh

Through active implementation of the expert missions as well as other educational and practical activities such as training courses and national workshops, the project successfully brought about a marked increase in the number of nuclear medicine professionals and their capacity. A total of 2,774 nuclear medicine professionals were trained in oncology, cardiology and neurology, which represents an increase of 140% in comparison to the beginning of the project. Consequently, the annual application of nuclear medicine procedures to NCDs rose by 20%. On a national level, Vietnam showed a three-fold increase of oncologic applications while Thailand showed a 60% increase of neurologic applications. Likewise, the other participating Government Parties were able to introduce or experience significant development in nuclear medicine technologies in their countries.

Another RCA project, RAS/6/071 on "Strengthening Radionuclide Therapy for High Impact Cancer Treatment Strategy in Member States of the Regional Cooperative Agreement," was carried out in 2015-2017, with the aim to reduce mortality through augmenting the availability, knowledge and infrastructures of radionuclide therapy. **Radionuclide therapy** provides definitive cure in hyperthyroidism and thyroid cancer as well as serves as an alternative or complementary treatment for other types of cancer such as lymphoma, blood imbalances hepatic, neuroendocrine and bone cancers. The project focused on establishing supportive basis for providing radionuclide therapy by disseminating knowledge, technical know-hows and necessary infrastructures.



One of the most successful outcomes of this project was the dissemination of therapeutic use of radioactive Iodine-131 (I-131). I-131, produced using a nuclear research reactor, is used in radionuclide therapies to treat overactive thyroid and thyroid cancer. Administered into a patient, it accumulates in and destroys any cancerous thyroid tissue remaining after a surgery. This radionuclide therapy significantly contributed to improving the survival rate of patients with hyperthyroidism and differentiated thyroid cancers in the region.