RCA News Letter

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9th Issue of the RCA Newsletter

The 22 RCA Government Parties are gathering at the Nadi, Fiji for the 47th Meeting of National RCA Representatives to discuss issues related to the RCA governance and Programme. Representatives from the IAEA and RCARO, as well as RCA experts will join the discussions on the various agenda including review of the progress of the RCA Programme and preparations for the 2026-2027 programme cycle. This issue also features the results and outcomes of completed RCA projects in 2024, an overview of the Philippine's participation in the RCA, and RCARO Scholarship Program. To subscribe the newsletter, please **click here** or contact rcaro@rcaro.org.

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RCA News

RCA Government Parties Pave the Way for Future RCA Programme and Launch Regional Event for Women in Nuclear

The 53rd RCA General Conference Meeting was held in Vienna, Austria on 13 September 2024

The Regional Cooperative Agreement for Research, Development, and Training Related to Nuclear Science and Technology for Asia and the Pacific (RCA) is an intergovernmental regional agreement comprising 22 RCA Government Parties. The National Representatives (NRs) of these parties meet twice a year to review and discuss issues related to the implementation of the RCA programme and related policy matters. The Meetings include the National RCA Representative Meeting (NRM) held in April/May and the General Conference Meeting (GCM) held in September.

Key Outcomes of the 53rd RCA General Conference Meeting (GCM)

The 53rd RCA GCM was held on 13 September 2024, at the IAEA Headquarters in Vienna. The Meeting discussed the progress of the social and economic impact assessment of the RCA Programme, pathways for new membership to the RCA, and the activities of the RCA Regional Office (RCARO). As part of the Meeting, the RCA successfully organized a side event at the 68th IAEA General Conference, along with a special exhibition at the IAEA Ministerial Conference on Nuclear Science, Technology, and Applications. These events highlighted the RCA Programme's achievements and strengthened regional and international engagement.

Upcoming 47th National Representative Meeting (NRM) in Fiji

The 47th National Representative Meeting (NRM) will take place in Nadi, Fiji, from May 19-23, 2025. The key agenda includes the implementation of the RCA programme in 2025, the development of projects for the 2026-2027 TC Cycle, the review of the RCA Annual Report, and the review of the Working Group and the appointment of the RCA Programme Advisory Committee Chair (PAC) and members.

New Regional Event to Promote "Women in Nuclear"

A major milestone endorsed by the 53rd RCA GCM is the launch of a regional event dedicated to Women in Nuclear. This initiative aims to discuss the current status and future strategies to enhance the representation of women in the nuclear field in the Asia-Pacific region and to provide a forum where women in the nuclear field can share success stories. The hybrid event will be hosted in June 2025 in the Republic of Korea with participation from the partner

institutes, including WiN Global, UN Women, the IAEA, and other regional/international organizations. The event will underscore the RCA's commitment to gender equity and its leadership in promoting "Women in Nuclear."

Looking Ahead: 54th RCA GCM in Vienna

The RCA Government Parties will also continue discussion on policy matters, including preparation for the 54th GCM, which will be held in September 2025 at the IAEA headquarters in Vienna. Through these efforts, RCA remains committed to strengthening regional cooperation, advancing nuclear science and technology, and fostering diversity and inclusion in the field.

RCA Policy Meetings

The National RCA Representatives of the 22 Government Parties (GPs) have two policy meetings each year; the National RCA Representatives Meeting (NRM) and the General Conference Meeting (GCM).

RCA NRM

The NRM takes place in the first quarter in the country of one of the RCA GPs to discuss and review matters related to RCA policy, the programme, and other issues. The agenda includes follow-up actions of the previous GCM, review of the RCA Annual Report, implementation of RCA Programme, and activities of Working Groups and RCA Programme Advisory Committee (PAC). The NRM officially elects the incoming RCA Chair at the beginning of the meeting. One day prior to the NRM, the RCA organized the meeting of the RCA Chairs and RCARO Standing Advisory Committee (SAC).

RCA GCM

The RCA GCM is held at the IAEA headquarters annually, one week prior to the IAEA General Conference in September, to discuss the follow-up actions of the previous NRM and to consider matters related to the progress made on RCA policy, and the Programme. The meetings of the RCA Chairs and RCARO SAC are held the day before the GCM.

RCA Projects

Promoting Food Irradiation by Electron Beam and X-ray Technology to Enhance Food Safety, Security and Trade

- **Tran Minh Quynh** | Principal Researcher, LCC Hanoi Irradiation Center, Vietnam Atomic Energy Institute

Overview of RAS5087

Ensuring food security and providing safe food for an ever-growing population, especially in the era of climate change, is one of the most essential requirements for every GP in the RCA region. In the past, food irradiation has been proven to be an effective method to reduce postharvest losses, enhance food safety, and facilitate regional and interregional food trades. Nowadays, it has been widely applied in many countries, and become an obligate measure for sanitary and phytosanitary treatment of most agricultural products in developed countries like Australia, New Zealand, and America. Commercial applications of food irradiation are now firmly established though total treated foods remain limited in the region, excluding China.

Most irradiation facilities for food irradiation in the region are based on cobalt-60 (^{60}Co), the source is becoming problematic due to the availability, management, and treatment of radioactive waste. Increasing concerns about security issues associated with the international transport of high-activity, radioactive sources add to uncertainties of supply and additional costs. Moreover, increasing demand of ^{60}Co source for radiation sterilization has somewhat affected the commercialization of food irradiation. Therefore, it is necessary to diverse irradiation technology for food to ensure that processing capacity can be expanded and will meet the industrial requirements.

In 2018, a new RCA project was proposed to address the over-reliance on food irradiation in ^{60}Co gamma facilities and promote future irradiation (EB/X-ray) technologies. Emerging technologies specifically for food irradiation were also considered. With the title “Promoting food irradiation by EB and X-ray technology to enhance food safety, security, and trade”, the RAS5087 project has satisfied the common interest in the RCA region and addressed the problems related to reducing postharvest losses, increase food safety, and facilitate the regional and interregional trade of fresh fruits and other agriculture products. The project has involved 21 RCA GPs including Australia, Bangladesh, Cambodia, China, Fiji, India, Indonesia, Japan, Lao PDR, Malaysia, Mongolia, Myanmar, Nepal, New Zealand, Pakistan, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, and Viet Nam, participated in the 4-year, which began in 2020 and completed in 2023.

Project activities and outputs

Fig.1 First project meeting, 3-4 September 2020

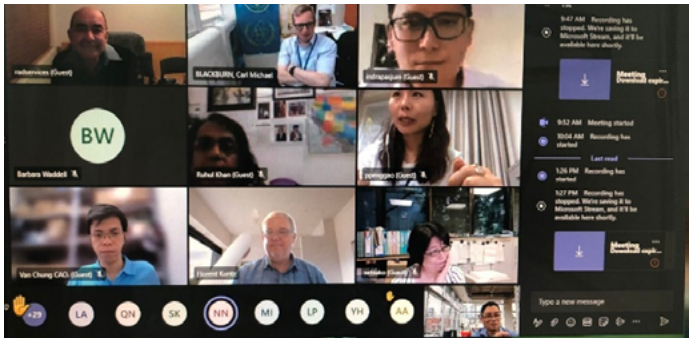

Fig.2. Virtual RTC, 30 August-1 September 2021

Participation of scientists, food manufacturers, stakeholders; and involvement of irradiation modalities are very important to achieve the project outputs and outcomes. Then, the project was designed to better integrate the technical capabilities of electrically generated irradiation facilities with the needs of the food industry. During the project implementation, National Project Coordinators (NPCs) took the lead in each GP, built and followed national work plans, prepared the documents and reports with the project team, and submitted them to the Technical Officer (TO), Lead Country Coordinator (LCC), and Project Management Officer (PMO). Then, LCC prepared a project report to the RCA Secretariat. Although there were some delays, the close and strong cooperation of LCC, with TO, PMO, and some NPCs enabled the project activities to be implemented as planned with some good results.

The first project coordination meetings were conducted virtually from 3-4 September 2020 because of COVID-19 restrictions on travel. Despite the pandemic, all GPs committed to strengthening cooperation between facilities and beneficiaries to follow their work plan and promote food irradiation in the RCA. The participation of some private EB/X-ray facilities and food industries in virtual Regional Training Course (RTC) on "Electron Beam/X-Ray Technology and the Future of Food Irradiation in the RCA Region" held from 30/8 to 1/9/2021 facilitated all GP agreed recommendations to harmonize the food irradiation regulations in the region to permit maximum energy X-ray up to 7.5MeV, as permitted by India and Indonesia.

Fig.3 Final Project Review Meeting, Hanoi, Vietnam 30/10-3/11/2023

Fig4. Participants visit EB/X-ray facility
(AnPhu Irradiation Company, Bac Ninh, Vietnam)

Due to the COVID-19 pandemic, the first face-to-face meeting was held in Cairns, Australia from 1-5 August 2022, and involved only 13 GPs. Though some activities at the national level, such as dose inter-comparison, quality management, seminars, and forums to promote the food irradiation application were conducted in some GPs, most of the goals, outputs, and outcomes of the project have been achieved as reported in the Final Project Review Meeting held in Hanoi, Vietnam, 30 October – 3 November 2023.

Contributions and Achievements

The achievements of RAS5087 can be analysed from the Performance Indicators: i) Number of facilities and countries using EB/X-ray sources; ii) Total facility numbers; iii) Volumes

Contributions and Achievements

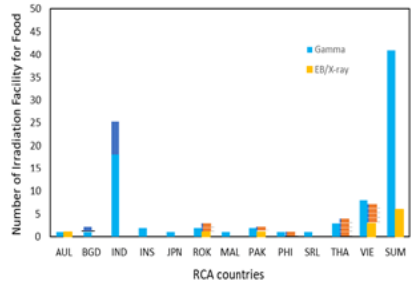

Fig.5 Number of irradiation facilities in RCA GP

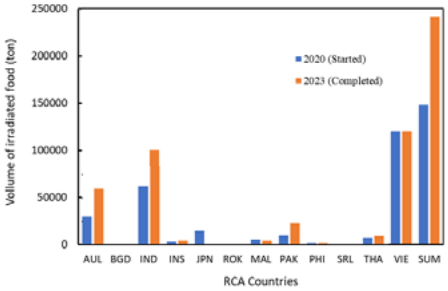

Fig.6 Volumes of the treated foods in RCA GP

of the food treated. As indicated in the figures, the number of food irradiation facilities has increased which shows the development of commercial food irradiation in the region. Gamma has increased (41 to 49); EB (3 to 10) and X-Ray (6 to 11). Eight countries (Australia, Cambodia, China, Indonesia, Korea, Pakistan, Thailand, and VietNam) are now operating commercial food irradiation facilities using EB/X-ray sources, an increase from five in 2020. One success of the project was the increase of the maximum energy of X-rays from 5 to 7.5 MeV in the International Standards for Phytosanitary Measures No. 18 (ISPM 18). It can be concluded that the project has achieved its outputs and outcomes. The implementation of its activities at the regional, and subsequently at the national level, has provided benefits to all participating RCA GPs, despite COVID-19 restrictions.

To promote the successful outcomes of the RAS5087, GPs requested the Agency to: Continue to provide further support for food irradiation using accelerator technology with contributions of equipment producers, food industries, and experts; Facilitate information exchange through a new network formed from the participants of this project "International Food Irradiation Network (iFINE)"; and request the CODEX Alimentarius to bring their standards into line with ISPM 18.

It is hoped that the success of RAS5087 will be replicated or further promoted in the follow-up project "Supporting the Adoption of Electron Beam Technology and its Applications in Areas of Food and Agriculture, Industry, Human Health, and Environment Treatment", which started in 2024.

RCA Project Achievements in 2024

- **Khemphone Phaokhamkeo** | RCA Focal Person, International Atomic Energy Agency

RAS5088	*Enhancing Crop Productivity and Quality through Mutation by Speed Breeding (RCA)*
Objective	To improve food security in the Asia Pacific region through faster release of mutant varieties with improved crop productivity and quality

Enhancing crop productivity and quality remains a critical priority in the Asia-Pacific region to meet the challenges of population growth and climate change. Over the past 60 years, plant mutation breeding has played a pivotal role in developing new mutant varieties, elite lines, and mutant germplasm. However, the traditionally long breeding cycles have limited the timely release of improved varieties. To address this, advanced speed breeding techniques such as double haploids, marker-assisted selection, and artificial growth environments are being utilized to develop genetically stable lines. Despite their potential, these techniques have not yet been widely adopted across the Asia-Pacific region. The RAS5088 project, launched in 2021 and completed in 2024, introduced an innovative approach by combining mutation induction with speed breeding to develop a novel approach known as Mutation by Speed Breeding (MbyS). This innovation method aimed to accelerate crop improvement and was envisioned for broader application across RCA Government Parties through regional training courses, expert missions, and technical meetings.

The Plant Mutation Breeding Network for Asia-Pacific expanded its reach globally by launching Mutation Breeding Network Plus (MBN+), fostering international collaboration in mutation breeding and biotechnologies. A total of 121 young researchers (61 female, 60 male) received training on MbyS, leading to the successful release of a mutated rice variety by a female farmer. Regional partnerships flourished, with Laos securing the Mekong-Korean Cooperation Fund (MKCF) for a joint program with Vietnam, and institutions from Indonesia, Malaysia, Thailand, China, and Vietnam contributing to seed irradiation efforts. The IAEA's support enabled Mongolia to establish speed breeding techniques for wheat breeding. These efforts have led to the development of high-quality, high-yield, and stress-tolerant crop varieties, delivering tangible socio-economic benefits.

RAS9092	*Strengthening the Capacity to Respond to Radiological Emergencies of Category II and III Facilities (RCA)*
Objective	To ensure radiation safety for workers and the public during nuclear or radiological emergency in the RCA region.

The RAS9092 project, launched in 2020 and completed in December 2024, focused on strengthening the capacity of RCA participating countries to respond to radiological emergencies in category II and III facilities. The project aimed to enhance radiation safety for workers and the public during nuclear or radiological emergencies by implementing protection strategies aligned with the IAEA Safety Standards (GSR Part 7).

The project played a pivotal role in enhancing emergency preparedness and response (EPR) capacities within participating countries. Despite the challenges and the impacts on the work plan due to the COVID-19 pandemic, the project made necessary adjustments to ensure successful implementation. Through this project, participating GPs gained expertise in developing protection strategies for category II and III emergencies. This knowledge enabled them to establish and implement robust EPR arrangements, significantly strengthening their national EPR capacities. Many countries strengthened regulatory frameworks, improved planning, and invested in human resource development to bolster emergency preparedness. Essential equipment, such as personal radiation detectors, was successfully procured through the IAEA and distributed, further enhancing EPR capabilities. 83% of countries reported advancements in planning and regulatory frameworks. 75% improved efforts to align with IAEA safety standards. 67% enhanced procurement capabilities. A 33% increase was recorded in environmental monitoring efforts.

Featured Articles

Thailand's Biodosimetry Network: Advancing Capabilities in Radiation Exposure Assessment

- **Pimpon Uttayarat** | Senior Nuclear Scientist, Thailand Institute of Nuclear Technology

The Biodosimetry Network of Thailand was officially inaugurated on January 4, 2013, under the leadership of the Office of Atoms for Peace (OAP). The kickoff meeting brought together four founding institutes: OAP, Kasetsart University, Ramathibodi Hospital, and the Thailand Institute of Nuclear Technology (TINT). Over time, seven additional institutes joined the network. Before its inception, the network had already established the dicentric assay (DCA) techniques, developed collaboratively by Kasetsart University and Ramathibodi Hospital under the supervision of Dr. Wanwisa Sudprasert and Dr. Budsaba Perkamnuaychoke, respectively, in partnership with Dr. Mitsuaki Yoshida from Hirosaki University, Japan. While DCA remained the core technique shared across network members, new methodologies were encouraged to strengthen the network's ability to respond to unforeseen radiological events. Around that time, the γ-H2AX assay emerged as a promising high-throughput technique in biodosimetry and a personalized tool in radiation therapy. Recognizing its potential, TINT proposed to explore and develop the γ-H2AX assay as an extension of the network's capabilities.

Development of the γ-H2AX Assay

The γ-H2AX assay focuses on the early response to radiation-induced DNA double-strand breaks (DSBs). When DNA damage occurs, hundreds to thousands of histone H2AX subunits at the damaged sites are rapidly phosphorylated, forming γ-H2AX, which recruits other proteins along the cascade to initiate DNA repair. The expression of γ-H2AX rises within 30 minutes, peaks at 1–2 hours, and returns to baseline within 24 hours. During its peak, γ-H2AX appears as foci inside the cell nuclei, which can be visualized using immunofluorescence labeling. These foci can be quantified using intensity-based techniques such as flow cytometry and image analysis.

To develop the γ-H2AX assay, TINT initially used a cell culture model between 2013 and 2014 to establish protocols

Figure 1: The setup of water phantom for the irradiation of whole blood samples by a Co-60 teletherapy machine at SSDL

for γ-H2AX labeling and quantification by flow cytometry and confocal imaging. Later, from 2018 to 2020, the assay was adapted for human blood samples with further protocol adjustments. During this phase, TINT collaborated with the Secondary Standard Dosimetry Laboratory (SSDL), Bureau of Radiation and Medical Devices, Ministry of Public Health, Bangkok, and the Faculty of Medicine Siriraj Hospital. The SSDL provided the water phantom setup and a Co-60 teletherapy machine (Figure 1), while flow cytometry and confocal microscopy analyses were conducted at Siriraj Hospital. The absorbed dose rate to water was pre-determined using an ionization chamber following IAEA guidelines. Additionally, nanoDot™ was used to determine the absorbed doses for the experiments. Before ex vivo irradiation of whole blood samples, informed consent was obtained from each donor. After irradiation and initial sample processing, white blood cells were isolated immunofluorescently labeled for

γ-H2AX, and divided into two portions. The first portion was analyzed by flow cytometry, which gated γ-H2AX signals from the lymphocyte population. The second portion was examined by confocal microscopy, followed by foci counting on recorded images.

Key Findings

Flow cytometric analysis demonstrated a linear dose-response relationship of γ-H2AX expression in lymphocytes over the dose range of 0.5–6 Gy. In addition to constructing the dose-response curve, this study also compared two different flow cytometry setups in analyzing the same set of samples. The results showed a strong positive correlation between measurements, supporting the potential of flow cytometry as a high-throughput tool for large-scale sample analysis.

Foci counting revealed that discrete γ-H2AX foci in lymphocytes increased with dose until, at 4 and 6 Gy, foci began to overlap into large plaques. While flow cytometry provided rapid dose estimation, foci morphology obtained from image analysis proved useful for confirming dose estimates.

To further assess the accuracy of the dose-response curve, blind tests were conducted. Dose estimations below 1 Gy had an accuracy within 0.5 Gy, while discrepancies increased at higher doses, highlighting variation among individuals observed during the construction of dose-response curve. More details on the setups and results can be found in the publication at doi.org/10.1371/journal.pone.0265643.

Challenges and Future Perspectives

Although γ-H2AX is a promising high-throughput technique, its practical application remains challenging due to the rapid decay of γ-H2AX as DNA DSBs repair progresses. While the γ-H2AX project was initially designed to complement DCA in triage scenarios, access to exposed individuals may not always fall within the assay's effective time frame. Nevertheless, the persistence of foci [1], especially at high doses, can be further explored for its potential as a marker of irradiation. Additionally, the γ-H2AX assay remains valuable in radiation therapy due to variation in individual responses.

Thailand's Biodosimetry Network: Strengthening Capacity

Thailand's Biodosimetry Network was established through the visionary leadership of the late Ms. Siriratana Biramontri, Executive Advisor to the Secretary General of OAP, along with the steadfast support of Dr. Wanwisa Sudprasert and Dr. Budsaba Perkamnuaychoke. Their dedication has been instrumental in nurturing the network over the years. Various workshops and training sessions, organized under OAP sponsorship, including collaborations with IAEA experts, have significantly strengthened the network's capacity in biodosimetry. Research contributions from network members were presented at the International Nuclear Science and Technology Conference, organized by TINT in 2016. With the network's continued growth, the upcoming **Biological Dosimetry Workshop**, led by Ms. Issariya Chairam, PhD, a radiation biologist at OAP, is scheduled for April 2025.

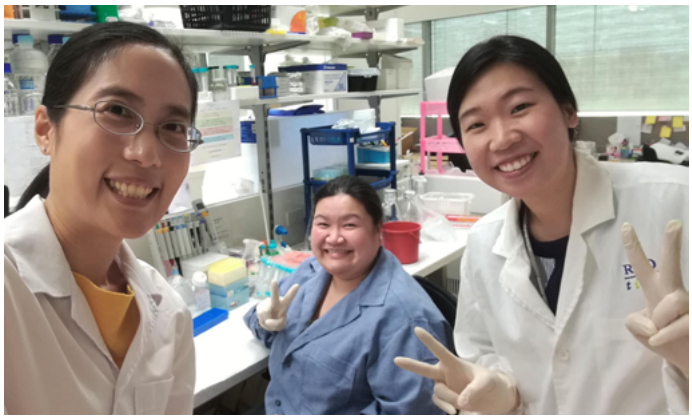

Figure 2: From lef to right, Pimpon, Sarinya, and Rujira conducting the experiment at the Faculty of Medicine Siriraj Hospital

Acknowledgments

Lastly, the author expresses deep gratitude to **Dr. Ruth Wilkins**, Division Chief of the Ionizing Radiation Health Sciences Division at Health Canada, for her invaluable insights on γ-H2AX during the assay setup. This project would not have been possible, especially through the challenges of the COVID-19 pandemic, without the dedication and hard work of **Ms. Sarinya Wongsanit** at TINT and **Dr. Rujira Wanotayan** at Mahidol University (Figure 2), whose contributions were instrumental to its success. The project was supported by funding from TINT, along with assistance on dose calibration of nanoDot™ from the Radiation Dose Measurement and Assessment Laboratory at TINT. Finally, the author sincerely thanks **Dr. Jarunee Thongpasuk**, whose mentorship and inspiration during her tenure as a radiation biologist at TINT introduced the author to the field of biodosimetry.

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The Efforts of the RCA Regional Office for Sustainable Socioeconomic Development in the Asia-Pacific Region

- **Dae Ki Kim** | Director, RCA Regional Office

The Role and Achievements of the RCA Regional Office

Over the past 50 years, the RCA has actively promoted the peaceful use of nuclear technology through technical cooperation projects and capacity-building initiatives. In 2002, the RCA Regional Office (RCARO) was established in Korea to enhance the RCA's visibility and viability. This article introduces the efforts undertaken by the RCA Regional Office over the past 20 years to strengthen these two key objectives, particularly focusing on improving viability.

Key Activities of the RCA Regional Office

Since its establishment, the RCA Regional Office has played a vital role in expanding the RCA Programme by working closely with international organizations and regional bodies. The office has mobilized funding through partnerships with those organizations and obtained funding from the host country, the Government of Korea, and relevant institutions to support RCA projects and conduct joint initiatives with other international/regional organizations.

To further strengthen these efforts, RCA Government Parties introduced relevant procedures in the Guidelines and Operating Rules in 2018 for implementing new project categories initiated by the RCARO. The project structure includes three new categories—Research Projects (RP), Supplementary Projects (SP), and Training Projects (TP)—which complement existing RCA projects. Building on these developments, the RCARO has been actively implementing the following key projects:

1. Direct Support and Operation of RCA Projects

Since 2016, the RCA Regional Office has directly supported Footnote/a projects with funding received from the Government of Korea, providing Extra-budgetary (EB) contributions and assuming the role of Lead Country Coordinator. RAS6083 has strengthened nuclear medicine capabilities in RCA Government Parties, contributing to improved diagnostic and therapeutic applications. RAS9092 has enhanced radiation emergency preparedness and response capabilities for nuclear facilities across the region.

Title	Period	Participating Countries	Budget
Improving Patient Care and Enhancing Government Parties Capacity in Nuclear Medicine Programmes in RCA Region (RAS6083)	2016-2018	Australia, Bangladesh, China, India, Indonesia, Korea, Laos, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Palau, Singapore, Thailand, Vietnam	420,000 Euros
Strengthening the Capacity to Respond to Radiological Emergencies of Category II and III Facilities (RAS9092)	2020-2024	Australia, Bangladesh, Cambodia, India, Indonesia, Korea, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Thailand, Vietnam	330,000 Euros

2. Implementation of Supplementary Projects for the RCA

Secondly, the RCA Regional Office has supported projects that address specific needs of the region. In particular, research projects are designed to meet key criteria, such as advancing research aligned with the medium to long-term needs of the RCA Programme, demonstrating the benefits of nuclear technology applications, and strengthening regional research networks and resources.

Since 2018, in line with the Guidelines, RCARO has facilitated environmental impact assessment related to industrial activities in Asia through RCARP01 and RCARP02. In 2022, RCARP03 was launched to help bridge the gap in access to radiation therapy across the Asia-Pacific region. With all Research Projects set to conclude in 2024, six new project proposals have been received, and final selection and funding will be determined following the established procedures.

Title	Period	Participating Countries	Budget
Air Quality and Environmental Impact Assessment of Industrial Activities in Asian Region (RCARP01)	2018-2020	Australia, China, Indonesia, Malaysia, Mongolia, Myanmar, Nepal, New Zealand, Pakistan, Korea, Thailand, Vietnam	200,000 Euros
Air Quality and Environmental Impact Assessment of Industrial Activities in Asian Region (RCARP02)	2021-2023	Australia, China, Indonesia, Malaysia, Mongolia, Myanmar, Nepal, New Zealand, Pakistan, Korea, Thailand, Vietnam	270,000 Euros
Closing the Gap in Radiotherapy Access in RCA Government Parties (RCARP03)	2022-2024	Australia, Indonesia, Malaysia, Mongolia, Philippines, Thailand	300,000 Euros

3. Expansion of Partnership Projects

The RCA Regional Office has collaborated with various international organizations* on numerous initiatives. Currently, the office is working on joint projects with the U.S. Department of Energy on electron beam technologies and with ASEANTOM on EPR-related cooperation. The procedure for initiating partnership projects is carried out through a flexible and needs-driven approach, following an appropriate process that includes a Fast Track review by the RCARO Standing Advisory Committee and approval by RCA Government Parties, ensuring timely project implementation. Moving forward, the RCA Regional Office plans to continue expanding collaborations with various international organizations to promote the sustained growth of the RCA Programme.

* Collaborating organizations: UNDP, UNOSSC, US DOE, ASEANTOM

Vision for the Future

The RCA Regional Office will continue to strengthen the visibility and viability of the RCA, striving to contribute to the sustainable socioeconomic development of the Asia-Pacific region. Moving forward, we sincerely hope for the continued support and collaboration of RCA Government Parties in these efforts. Thank you.

Articles from GPs

An Overview of the Philippines' Participation in the RCA

- **Andrea Luz G. Nery-Dela Cruz** | Senior Science Research Specialist, Philippine Nuclear Research Institute Innovation Agency)

The Philippine Nuclear Research Institute (PNRI), formerly known as the Philippine Atomic Energy Commission, has been the center of nuclear science and technology activities in the country since its establishment in 1958. The PNRI is mandated to develop and regulate the safe and peaceful uses of nuclear science and technology in the Philippines.

The Philippines joined the Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology or RCA in 1974. Since joining the RCA, the Philippines has participated in numerous regional cooperative projects under this framework under the purview of the designated National Representative (NR) and supported by National Project Counterparts (NPCs) and national teams who work to contribute toward the regional projects' objectives. Participation in the RCA projects has benefited the country in numerous ways over the years.

The RCA has certainly helped Filipinos in developing their capacities in performing studies on various topics such as food authentication, radiation processing, groundwater resource management, and radiopharmaceutical production. With this improved capability, Filipinos have been able to make an impact, as evidenced by the numerous publications, conference presentations, and established facilities.

Food and Agriculture

With food safety and security in mind, the Philippines has participated in regional cooperative projects on topics such as food authentication, food irradiation, and mutation by speed breeding.

The Philippines participated in the RCA project entitled "Enhancing Food Safety and Supporting Regional Authentication of Food Stuffs through Implementation of Nuclear Techniques" (RAS5081) in 2018-2021, where the PNRI utilized nuclear and isotopic techniques to explore the authenticity of food products such as vinegar, honey, coffee, and cacao. PNRI researchers are also developing nuclear and isotope-based analytical techniques for the authentication and geographical fingerprinting of organic foods and Halal products. These methods are meant to complement the established physico-chemical tests that are required under regulations for food products, as some fake or adulterated products can pass these tests and are sold in the market.

Studies conducted by PNRI scientists have shown that as many as 8 out of 10 vinegar products being sold in local markets in the Philippines are synthetic and utilize diluted acetic acid instead of fermented coconut sap or natural products. Meanwhile, studies also conducted by PNRI scientists have shown that 75% to 86.5% of honey being sold in the markets of the Philippines are adulterated. This data has been reported on major news outlets and also demonstrates that there is indeed a need to assist various food industries and to protect consumers against food adulteration and fraud, which can be done with the use of nuclear and isotopic techniques.

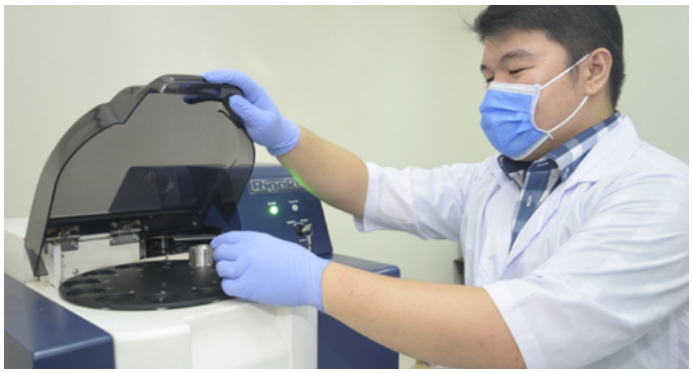


Figure 1. Food authentication studies using nuclear and isotopic techniques performed by PNRI researchers (Photo c/o DOST-PNRI)

Through participation in the RCA project entitled "Promoting Food Irradiation by Electron Beam and X-Ray Technology for Enhancing Food Safety, Security and Trade"(RAS5087) from 2020 to 2023, studies have been conducted on the use of radiation processing for enhancing food safety, quality, and agricultural trade. PNRI researchers have studied the effect of irradiation on fruits such as strawberries and lanzones in reducing the population of fungal pathogens which will result in a longer shelf-life. Studies have also been done on raw beef patties wherein the use of electron beams has kept these products fresh for up to seven (7) months while maintaining the taste and meeting industry safety standards.

Research utilizing nuclear techniques is not limited to PNRI since researchers from the University of the Philippines Los Baños – Institute of Crop Science are leading studies on rice through a process called mutation by speed breeding. A national team is working through the ongoing project entitled "Enhancing Crop Productivity and Quality through Mutation by Speed Breeding" (RAS5088) which started in 2020. The use of speed

breeding over conventional breeding technologies allows for the development and selection of mutants with better characteristics at a faster rate as this technique reduces the breeding cycle by producing many generations within a short period. Thus, mastering the speed breeding technique could lead to the creation of better varieties of rice with higher yields and higher resistance to biotic and abiotic stresses in a shorter amount of time.

Environment

Nuclear and isotopic techniques have proven to be excellent tools in environmental studies such as in soil erosion assessment, measuring sedimentation rates, water resource management, wetland and suitable conservation planning, and marine radioactivity monitoring.

Researchers at the PNRI and the Department of Agriculture – Bureau of Soil and Water Management participated in the RCA project entitled "Assessing and Improving Soil and Water Quality to Minimize Land Degradation and Enhance Crop Productivity Using Nuclear Techniques" (RAS5084) from 2018 to 2021 where the national project team worked toward assessing soil erosion in Manila Bay with the use of nuclear and isotopic techniques. The work done under this project will contribute to the estimation of soil erosion in five dominant land use types in Talugtug, Nueva Ecija, a sub-watershed of Manila Bay.

PNRI has also participated in the RCA project entitled "Assessing the Vulnerability of Coastal Landscapes and Ecosystems to Sea-level Rise and Climate Change" (RAS7031) from 2019 to 2022 where the researchers utilized radiometric and stable isotopes to assess the vulnerability of coastal landscapes and ecosystems to sea-level rise. Rates of sediment supply are analyzed through radiometric dating techniques which are then complemented with stable isotope analyses to determine the sources of the sediments. Data on sedimentation rates and the sources of sediments allow researchers to identify and propose adaptation options to relevant government bodies for the improvement of shoreline resilience and the delivery of ecosystem services.

Researchers at the PNRI have partnered with other government agencies and local government units such as the National Water Resources Board (NWRB) and the Davao City Water District for efforts toward water resources management as shown in their participation in the RCA project entitled "Enhancing Regional Capability for the Effective Management of Ground Water Resources Using Isotopic Techniques" (RAS7035) from 2020 to 2023. Nuclear and isotope-based analytical techniques have been used in characterizing the groundwater sources in areas such as Davao City, particularly the origin of groundwater, rate of recharge and its vulnerability to pollution in the face of rapid urbanization.

PNRI has also participated in the RCA project entitled "Enhancing Wetland and Suitable Conservation Planning" (RAS7037) from 2020 to 2023 and collaborated with the Catanduanes State University where they studied the Nabaoy

Figure 2. A PNRI researcher using the ultra-low-level tritium enrichment system to determine the age of groundwater samples (Photo c/o DOST-PNRI)

watershed and the Boracay island wetlands. The PNRI led in the application of nuclear analytical techniques and isotope abundance analyses in wetlands management and protection studies while the Catanduanes State University utilized its innovative Integrated Mangrove Aquaculture (IMA) system and provided technical support for studies done in the Catanduanes island. Studies related to improving water resources management were continued with the participation of the Philippines in the ongoing RCA project entitled "Improving Water Resources Management Practices by Enhancing Regional Collaboration in Environmental Isotope Analysis and Applications" (RAS7040) which will run until 2025.

PNRI also participated in the RCA project entitled "Enhancing Regional Capabilities for Marine Radioactivity Monitoring and Assessment of the Potential Impact of Radioactive Releases from Nuclear Facilities" (RAS7028) from 2017 to 2022. The national project team focused on monitoring the marine environment of the West Philippine Sea which has become an important body of water because of increased activities related to energy explorations, mining activities, waste dumping, and nuclear energy production in neighboring countries. Marine samples such as seaweeds and snapper (Lutjanidae) were collected and tested for natural and anthropogenic radionuclides through gamma spectroscopy to monitor the radioactivity in the said samples.

Industry

Radiation processing has proven that it has many beneficial applications in our everyday lives. It is a process that uses high doses of ionizing radiation to alter the biological, or physical and chemical properties of substances or products.

Through participation in RCA projects such as the project titled "Improving the Quality Management Practices in Radiation Processing Facilities for Better Performance and Applications" (RAS1028) alongside national projects has helped the PNRI improve its irradiation facilities in order to provide better services to customers who are involved in research and development and the food industry among others by ensuring the quality of irradiation services provided.

With the assistance of the IAEA, along with other collaborators and national funding, the PNRI's Multipurpose Irradiation Facility was upgraded to meet the increasing industrial demand for radiation processing. The facility, now renamed as PHILGamma, was inaugurated and reopened in November 2023. PHILGamma is now fully automated and operates continuously with less shut-down time thereby maximizing the use of its Cobalt-60 source. PhilGAMMA is now capable of processing thousands of samples such as food, spices, and experimental samples.

Figure 3. Inauguration of the PhilGAMMA on November 6, 2023 (Photo c/o DOST-PNRI)

The PNRI also manages an Electron Beam Irradiation Facility (EBIF), the first facility of its kind in the Philippines that is open for semi-commercial services while supporting the Institute's research and development for advanced nuclear and radiation applications. One of the primary users of the EBIF are technology adaptors of the PNRI's award-winning Carrageenan Plant Growth Promoter (PGP) which is made from seaweed processed through electron beam irradiation. Approximately 140,000 liters of PGP are produced annually by the EBIF and this product is sold and distributed across farm lands and stores throughout the Philippines.

Both the PhilGAMMA and EBIF have been key players in the different projects conducted by PNRI and its collaborators utilizing radiation processing. Examples of the products developed by PNRI researchers utilizing radiation processing include the Carrageenan Plant Growth Promoter, life-saving hemostatic granules and dressing for quick control of traumatic bleeding, and radiation-modified abaca fabric as a cheaper alternative in filtering toxic metals. These researches have received recognition from local and international organizations and would not have been possible without the radiation processing facilities providing excellent and quality services.

Meanwhile, the Philippines has also been working on efforts related to non-destructive testing (NDT), which is defined as a variety of analysis techniques used to evaluate the properties of a material, component, or system without stopping operation or causing damage. NDT has proven to be essential for many reasons, such as in ensuring structural integrity and reliability of components and systems, minimizing the risk of failure and accidents through early detection of defects, and reducing costs associated with material wastage and repairs. The PNRI,

Figure 4. The PhilGAMMA was upgraded to meet the increased demand for radiation processing to match clients' production and increase their income. (Photo c/o DOST-PNRI)

along with collaborators from the Metals Industry Research and Development Center (MIRDC) and the Philippine Society for Nuclear Medicine (PNSM), have participated in RCA projects such as "Strengthening Regional Capacity in Non-Destructive Testing and Examination using Nuclear and Related Techniques, for Safer, More Reliable, More Efficient and Sustainable Industries including Civil Engineering"(RAS1022) from 2019 to 2022 and the ongoing RCA project entitled "Enhancing Regional Capabilities in Advanced Non-Destructive Testing Techniques for Improved Safety and Inspection Performance in Industries" (RAS1029) which aims to train engineers and technicians in order for them to receive certification as radiographic testers.

Human Health

Nuclear techniques are also widely used in medicine and can be seen in the management of cancer and other non-communicable diseases through radiotherapy and nuclear medicine. From diagnosing illnesses to finding the right treatments, there are several uses of nuclear techniques that Philippine doctors from different parts of the country are working on cancer management and the management of other non-communicable diseases (NCDs) with the help of the RCA.

Nuclear medicine is defined as a branch of medicine that involves the use of radiopharmaceuticals to diagnose, and in some cases, treat diseases such as cancer. Doctors have participated in RCA projects such as "Strengthening Capacity to Manage Non-communicable Diseases using Imaging Modalities in Radiology and Nuclear Medicine" (RAS6093) in 2019 to 2022, which aims to implement better management and control of NCDs in the RCA region in line with UN SDGs and WHO Global Action Plan for the Prevention and Control of NCDs 2013-2020. Through participation in these projects, nuclear medicine professionals were able to participate in training courses on the diagnosis of cardiovascular and pulmonary diseases, as well as pediatric nuclear medicine, with the goal of improving their capabilities in utilizing nuclear techniques in diagnosing these diseases.

Radiopharmaceuticals play a major role in nuclear medicine, particularly in the diagnosis of cancer and other NCDs. PNRI has participated in the RCA project entitled "Enhancing Regional

Capacity and Capability for the Production of Cyclotron-Based Radiopharmaceuticals" (RAS6097) since 2020, which aims to enhance disease control in the Asia Pacific region through strengthening the capacity and capability of qualified cyclotron-produced radiopharmaceuticals for imaging and treatment. Through this project, PNRI researchers have received training on the set-up of a cyclotron facility for radiopharmaceutical production, good manufacturing practice (GMP) and radiation safety aspects of radiopharmaceutical production using a medical cyclotron, and production and quality control of commercial and emerging cyclotron-based radiopharmaceuticals. The training received by the members of the project team will be beneficial and will complement the PNRI's plans of establishing the Nuclear Medicine Research and Innovation Center (NMRIC), a facility that aims to make cancer diagnostics and treatment more affordable for Filipinos.

Figure 5. Groundbreaking ceremony for the Nuclear Medicine Research and Innovation Center located in PNRI (Photo c/o DOST-PNRI)

Newer RCA projects on nuclear medicine are focused on theranostics, where in radiopharmaceuticals are used for both diagnosis and treatment, and is considered as one of the latest advances in cancer diagnosis and treatment. Projects such as the RCA project entitled "Improving Cancer Management through Theranostics by Using Radioisotope Based Diagnostic and Therapeutic Techniques" (RAS6105) which started in 2024, aim to contribute to strengthening diagnostic and therapeutic capacities in clinical nuclear medicine by enhancing theranostics to improve cancer management. Through these projects, doctors will receive training on theranostics and hopefully utilize the knowledge of this new technology so that it can be used in treating cancer in the Philippines.

The Philippines also participated in the RCA project entitled "Strengthening Cancer Management Programmes in the RCA State Parties through Collaboration with National and Regional Oncology Societies" (RAS6086) from 2018 to 2021, which aimed to improve the cancer management in RCA State Parties by training radiation oncology professionals in collaboration with RCA and Asia Pacific national/regional radiation oncology societies. Through this RCA project, doctors specializing in radiation oncology were able to train on important topics such as image-guided brachytherapy (IGBT), modern radiotherapy techniques for head and neck cancers, and even risk management, radiation safety, and quality assurance in radiotherapy.

Medical Physics is described as the application of physics to medicine where physics concepts and procedures are used in the prevention, diagnosis, and treatment of disease. Medical Physics is applied in radiotherapy, nuclear medicine, diagnostic radiology, and radiation protection and Medical Physicists play major roles in helping doctors in cancer management and medical imaging. Medical Physicists, through the Society of Medical Physicists in the Republic of the Philippines (SMPRP), have participated in RCA projects such as the project entitled "Enhancing Medical Physics Services in Developing Standards, Education and Training through Regional Cooperation" (RAS6087) in 2018 to 2021, and the ongoing RCA project entitled "Improving the Quality and Safety of Radiation Medicine through Medical Physicist Education and Training" (RAS6101) which aim to improve the quality and safety or radiation medicine in the Asia-Pacific region through the education, training, and certification of Medical Physicists. Through these RCA projects, medical physicists have been trained on quality management and quality assurance in radiotherapy and in medical imaging. Training courses on medical physics academic programmes and clinical training programmes are also conducted to create a base of competent medical physicists who will ensure the safe and effective use of radiation in their field of specialization.

Radiation Safety

The RCA programme has provided assistance and opportunities for Filipinos, particularly in the field of emergency preparedness and response. The Philippines participates in the ongoing RAS9092 project entitled "Strengthening the Capacity to Respond to Radiological Emergencies of Category II and III Facilities" that started in 2020 and aims to ensure radiation safety for workers and the public during nuclear or radiological emergencies in the RCA region.

The Philippines currently has Category III facilities with the PHILGamma and the Philippine Research Reactor-1, thus requiring the capability to plan and respond to nuclear and radiological emergencies in compliance with the regulations listed in the IAEA Safety Standards, GSR Part 7. With the help of training and workshops from the RAS9092 project, the Philippines has made significant progress in creating its Emergency Preparedness and Response (EPR) plans for the facilities and the PNRI where they are located.

PNRI has also participated in the RCARO/ASEANTOM project entitled "Enhancing Emergency Preparedness and Response Capabilities in the ASEAN Region through Building Technical Capacity in Radiation Monitoring and Dose Assessment – Phase 1", as well as Phase 2 of the said project which aims to enhance the capabilities of participating countries in radiation measurement and environment monitoring. By participating in the said projects, researchers involved in environmental

radioactivity monitoring and nuclear and radiological emergency preparedness were able to participate in virtual and on-site training courses and workshops.

Impact of Regional Cooperation in the Philippines

The Philippines has participated in numerous regional projects since it joined the RCA in 1974. The examples mentioned under each thematic area are just a sample of the TC projects that the Philippines has participated in the recent years.

The International Cooperation Section (ICS) of the PNRI supports RCA National Project Counterparts and their national team members in organizing regional events and in facilitating nominations to training courses and workshops under RCA projects. The ICS assists by ensuring that the national project team members are able to participate in capacity-building activities that are crucial to the implementation of their research work.

Looking at the 18 regional projects under the RCA Cycle 2022-2023 alone, the PCMF lists a total of 78 Filipinos that have participated in training courses organized under these RCA projects as of October 2024. The lessons the participants have learned from the training conducted in these projects have translated to various outputs in the Philippines – numerous publications, awards, and recognitions, as well as new technologies and facilities.

The PNRI has been recognized as the institute with the highest number of papers published in internationally recognized journals among the agencies in the Department of Science and Technology (DOST) from 2020 to 2023 with about 30 to 40 publications produced annually. PNRI researchers and scientists have also received local and international recognition for their work by organizations such as the Civil Service Commission, the Philippine Association for the Advancement of Science, the DOST, and the Forum for Nuclear Cooperation in Asia (FNCA). Aside from publications, several technologies developed by PNRI researchers have been recognized as utility models and patents. Examples include radiation-processed materials such as the carrageenan plant growth promoter, hemostats, wound dressings, and abaca fiber filters.

Aside from the recognition from the publications and developed technologies, it is clear that the lessons learned by the members of the project team have rippled outward. Not only have trainees helped in ensuring the successful implementation of their projects, but they also have shared the acquired knowledge with their colleagues and collaborators through echo seminars, demonstrating the new techniques learned, or sharing the resources from the events they have attended. Through exposure to other laboratories and facilities, the trainees are able to experience new methods and see equipment that could help them in their work or even proceed to propose the establishment of new facilities such as the Nuclear Medicine Research and Innovation

Figure 6. PNRI garnered the highest number of international publications at the 2023 DOST International Publication Awards (Photo c/o DOST-PNRI)

Center which is currently being built in PNRI. Other facilities that aim to be research and development hubs and training centers are also being planned in the near future.

It is indeed evident that the Philippines has gained so much from its participation in the RCA. As the country continues to develop, there are also ways that it can assist other developing countries that are part of the RCA framework.

Some examples of possible ways that the Philippines can help build capacity would be through the following: 1) hosting fellows or accepting to host regional capacity-building activities under RCA projects, and 2) volunteering to analyze samples in equipment that is not yet accessible to other countries.

The PNRI has hosted several RCA events over the past years, and can potentially become a hub for training in certain fields such as in nuclear medicine and radiopharmaceutical production once the NMRIC has been established. Fellows have also been hosted by the Philippines to train in hospitals on radiotherapy and nuclear medicine or in the PNRI to learn about nuclear and radiation techniques such as radiation processing of polymers, quality management of irradiation facilities, non-destructive testing or isotopic techniques in environmental studies and food authentication.

In cases where hosting events or fellows may not be possible, the Philippines may also help other countries in analyzing their samples in order for them with equipment that may not be available in their laboratories or institutes and teaching them how to utilize the data for policy making or for sharing to relevant stakeholders. Training and coaching may also be done virtually, particularly for countries that require more assistance or are newcomers in the particular field.

This article simply provides a glimpse of the Philippines' participation in the RCA for the past 50 years. Truly, the Philippines has learned a lot through its participation in regional projects and will continue its work in spearheading the development of various nuclear and radiation-based technologies with the goal of improving the quality of Filipino life.

What's More'

Unlocking Opportunities: A Journey with the RCARO Scholarship Program

- **Khuong Minh Tu**

Greetings. My name is Khuong Minh Tu. I'm a PhD student from Vietnam, specializing in Radiation Science through the RCARO Scholarship Program at the Advanced Radiation Technology Institute (KAERI-ARTI). The first time I arrived in South Korea was about seven years ago to study for my Bachelor's degree at Hanyang University (Seoul campus). After finishing my master's degree, I am lucky to receive RCARO's Doctoral Scholarship and return to South Korea again. I'm excited to share my experience and hope it inspires others to consider the incredible path that the RCARO Scholarship Program offers.

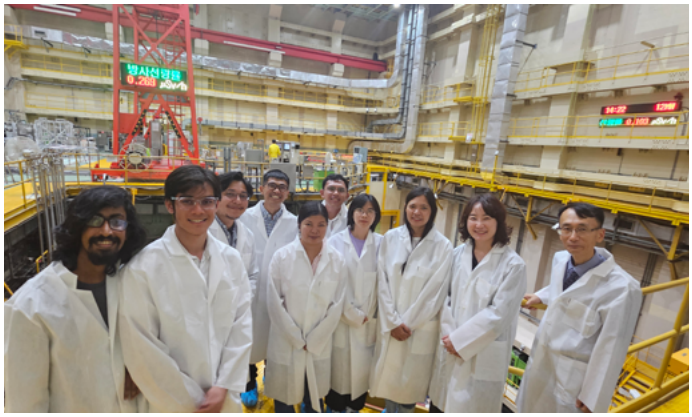
The RCARO scholarship program is meant to assist students from Regional Cooperative Agreement (RCA) member countries who wish to study and work in nuclear-related disciplines. The program plays an important role in educating and training the next generation of nuclear specialists, with a mission to preserve and advance atomic technology in their home countries. The RCARO scholarship program includes three subprograms: the RCA/KAIST Master's Degree Program, the RCA/KINGS Master's Degree Program, and the RCA/UST Doctoral/Integrated Master's Program. The RCARO-UST Doctoral program I enrolled in is conducted by the Regional Cooperation Agreement Office (RCARO) in partnership with the Korean University of Science and Technology (UST).

UST is a premier graduate school of science and technology, established in 2003 through a partnership among Korea's Government-Funded Research Institutes (GFRIs). UST offers an exceptional environment for students to engage in cutting-edge research and innovation across a network of 32 GFRIs, making it a distinctive model of an industry-academia system. This system provides students, especially international students, opportunities to work with top-tier experts and professionals in prestigious research institutes. The RCA-UST Program cooperates with two UST campuses, the Korea Atomic Energy Research Institute (KAERI) and the Korea Institute of Radiological and Medical Sciences (KIRAMS). The field of study includes:

- Nuclear Science and Technology: Radiochemistry, Quantum energy
- Chemical engineering, and Nuclear system engineering
- Radiation Science: Accelerators
- Quantum beams, Radiation life science
- Nuclear and Radiation Safety
- Artificial Intelligence
- Radiological and Medico-Oncological Sciences

Key features of the program include:

- Participation in National R&D Projects: Students have the opportunity to engage in research management and develop competencies while working on national projects.
- Access to High-Tech Research Facilities: UST provides state-of-the-art infrastructure that enhances the research experience.
- Networking Opportunities: Scholars can connect with experts in the nuclear field, gaining insights and mentorship on defined tasks.
- Hands-On Experience: Students benefit from practical exposure at renowned Korean institutes, including KAERI and KIRAMS.



Every year, the program selects fifteen students for the Doctoral and Integrated/Master's degree paths. Applications are assessed based on UST's selection criteria, including a recommendation letter from the National RCA Representative of the applicant's country. Scholarships cover tuition fees and provide a monthly stipend of approximately one and a half million KRW, along with an additional two million KRW for initial settlement support from RCARO. Therefore, among a long list of PhD programs and fellowships available, the RCA-UST PhD program truly appealed to me.

Moreover, I believe that the human factor has a crucial impact on my decision to join this program. From the initial stage, student support from the program was prompt and effective. Their responses to my concerns about the program were very helpful and informative. I also contacted RCA Vietnam Representatives from VINATOM and received so much support from them. These precious interactions truly enhanced my motivation and determination.

After the enrollment, my experience at UST has been nothing but pleasant. The university system is coherent, well-organized, and thoughtfully structured, creating an ideal environment for learning and research. As part of my research path, working and studying at KAERI-ARTI offers me an ideal environment for focused study and scientific exploration. The encouraging environment has greatly aided my progress as a newcomer.

In August 2024, RCARO organized an in-depth technical visit for ARC fellows from KAIST, KINGS, and UST. It included visits to KAERI's HANARO research reactor, the Korean Radioactive Waste Agency's (KORAD) radioactive waste management facilities, and the Wolsong nuclear power plant. It was a great opportunity not just to gain a better grasp of nuclear technology in operation, but also to broaden our network in the sector. For young researchers, I think being able to discuss directly with nuclear specialists, about their knowledge and perspectives, truly boosts students' spirits and motivation.

It surprises me that a prestigious program like the RCARO Scholarship Program has not yet received much attention from students in nuclear-related fields, not only in Vietnam but also among RCA member countries. Via this newsletter, I hope to contribute to the growing community of young professionals in the nuclear field by sharing my experience, and benefits of the program as well as raising awareness of the RCARO Scholarship Programme and its remarkable benefits. Finally, I would like to express my gratitude to RCARO for giving me a wonderful opportunity to be a part of the RCARO Scholarship program, and a special thanks to Mrs. Kelly Hwang for entrusting me with writing this newsletter.

Calendar of RCA Projects in 2025

January

SUN	MON	TUE	WED	THU	FRI	SAT
29	30	31	1	2	3	4
5	6 ①	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27 ②	28	29	30	31	1

① *(RAS6101)* **RTC on Clinical Programmes**
Hanoi, Vietnam | 06 – 10 Jan

② *(RAS6109)* **Regional Workshop on the Role of the Medical Physicist in Quality Management of Radiology Department**
Chiang Rai, Thailand | 27 – 31 Jan

February

SUN	MON	TUE	WED	THU	FRI	SAT
26	27	28	29	30	31	1
2	3	4	5	6 ①	7	8
9	10	11	12	13	14	15
16	17 ②	18	19	20	21	22
23	24	25	26	27	28	1

① *(RAS6105)* **Expert Group Mission to Attend Nuclear Medicine Update 2025**
Singapore | 06 – 09 Feb

② *(RAS5101)* **First Coordination and Technical Planning Meeting**
Vienna, Austria | 17 – 21 Feb

March

SUN	MON	TUE	WED	THU	FRI	SAT
23 / 30	24 / 31	25	26	27	28	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24 ①	25	26	27	28	29

① *(RAS6098)* **Expert Group Meeting to Develop Palliative RT at TMH**
Mumbai, India | 24 – 28 Mar

April

SUN	MON	TUE	WED	THU	FRI	SAT
30	31	1	2	3	4	5
6	7 ①	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	1	2	3

① *(RAS1028)* **Participation to the International Conference on Applications of Radiation Science and Technology (ICARST-2025)**
Vienna, Austria | 07-11 Apr

May

SUN	MON	TUE	WED	THU	FRI	SAT
27	28	29	30	1	2	3
4	5	6	7	8	9	10
11	12 ①	13	14	15	16	17
18	19 ②	20	21	22	23	24
25	26 ③ ④	27	28	29	30	31

① *(RAS6098)* **4th RTC on Optimization of Re-Irradiation in Palliation**
Malaysia | 12 – 16 May

② *(RAS0092)* **47th RCA NR Meeting**
Nadi, Fiji | 19 – 23 May

③ *(RAS7040)* **RTC on Sampling Protocols and QA/QC Programme of Isotope and Chemistry Analyses for Water Samples**
Quizon City, Philippines | 26 – 30 May

④ *(RAS6105)* **RTC on Clinical Applications of Theranostics by Using Ga-68 Labeled/Lu-177/Ac-255 Radiotracers**
Lahore, Pakistan | 26 – 30 May

June

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16 ①	17	18	19	20	21
22	23	24	25	26	27	28
29	30	1	2	3	4	5

① *(RAS7043)* **RTC on Measurement of Stable Isotopes and Radioisotopes in Water**
Bangkok, Thailand | 16-20 Jun

② *(RAS1028)* **Sub-regional Workshop on EB Irradiator Development for LDCs**
TBC | TBC

July

SUN	MON	TUE	WED	THU	FRI	SAT
29	30	1	2	3	4	5
6	7 ①	8	9	10	11	12
13	14	15	16	17	18	19
20	21 ②	22	23	24 ③	25	26
27	28	29	30	31	1	2

① *(RAS1029)* **Train the Trainer Course on RT-D Level 3 for Personnel Involved in the NDT Qualification and Certification Scheme**
Kajang, Malaysia | 07-16 Jul

② *(RAS7040)* **RTC on Dating Groundwater by the Use of 14C and Noble Gases Prospectus**
Bangkok, Thailand | 21-25 Jul

③ *(RAS6100)* **Regional Training Course for Medical Physicists and Radiation Therapists on Hypofractionated Radiotherapy**
Putrajaya, Malaysia | 24-28 Jul

August

SUN	MON	TUE	WED	THU	FRI	SAT
27 / 31	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25 ①	26	27	28	29	30

① *(RAS6108)* **RTC on the Minimum Dataset, Demonstration, Potential Ways to Use the Data for Quality Improvement**
Sydney, Australia | 25-29 Aug

September

SUN	MON	TUE	WED	THU	FRI	SAT
31	1	2	3	4	5	6
7	8 ①	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	1	2	3	4

① *(RAS1029)* **Regional Workshop on ISO 9712 Qualification and Certification Requirement in NDT for Civil Structures**
Christ Church, New Zealand | 08-12 Sep

② *(RAS0092)* **54th RCA General Conference**
Vienna, Austria | TBC

③ *(RAS6101)* **RTC on QC and QA in Radiotherapy**
TBC | TBC

④ *(RAS5101)* **RTC on Efficient Screening Methods for Improved Nutritional Quality in Mutant Populations**
Indonesia | TBC

October

SUN	MON	TUE	WED	THU	FRI	SAT
28	29	30	1	2	3	4
5	6 ② ③	7	8	9	10	11
12 ④	13	14	15	16	17	18
19	20 ⑤ ⑦	21	22	23	24	25
26	27 ⑧ ⑨	28	29	30	31	1

① *(RAS6100)* **RTC for Radiation Oncologists and Medical Physicists**
Mumbai, India | TBC

② *(RAS6101)* **RTC on Quality Management and QA Audits in Nuclear Medicine Medical Physics**
Bangkok, Thailand | 06-10 Oct

③ *(RAS5101)* **RTC on Advanced Mutation Breeding Techniques for Improvement of Nutritional Quality**
Faisalabad, Pakistan | 06-18 Oct

④ *(RAS6105)* **Joint RTC with ARASIA**
1. PET Hybrid Imaging with non FDG and Galium
2. PET Diagnostic Production and Quality Control on Now FDG F18 Radiopharmaceutical and Galium Radio pharmacy
Jordan | 12-16 Oct

⑤ *(RAS6110)* **RTC on Radiotherapy Professionals on Management of External Radiotherapy**
Jakarta, Indonesia | 20-24 Oct

⑥ *(RAS6109)* **Mid-term Review Meeting**
Virtual | TBC

⑦ *(RAS7040)* **Final Review Meeting**
Vientiane, Laos | 20-24 Oct

⑧ *(RAS1028)* **Final Review Meeting**
Malaysia | 27-31 Oct

⑨ *(RAS7043)* **RTC on Tritium and Organic Contaminant**
Islamabad, Pakistan | 27-31 Oct

November						
SUN	MON	TUE	WED	THU	FRI	SAT
26 / 30	27	28	29	30	31	1
2	3 ①	4	5	6	7	8
9	10 ②	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25 ③	26	27	28	29

① *(RAS7043)* **Mid-term Review Meeting**
Hanoi, Vietnam | 03-07 Nov

② *(RAS5091)* **Final Review Meeting**
Vienna, Austria | 10-14 Nov

③ *(RAS6100)* **Final Review Meeting**
Virtual | 25-28 Nov

December						
SUN	MON	TUE	WED	THU	FRI	SAT
30	1 ①	2	3	4	5	6
7	8 ②	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3

① *(RAS6098)* **Final Review Meeting**
Mumbai, India | 01-05 Dec

② *(RAS6105)* **Mid-term Review Meeting**
Vienna, Austria | 08-12 Dec

RCA at a Glance

The RCA (Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology for Asia and the Pacific) **is an intergovernmental agreement among the IAEA Member States that are located in South Asia, South East Asia and the Pacific, and the Far East.**

Establishment

1972

Membership

Member States of the International Atomic Energy Agency (IAEA) in the Asia and the Pacific Region. Current membership 22 states.

Objective

To cooperate with each other and the IAEA in the use of nuclear techniques to contribute to the socio-economic development of the members (Government Parties) of the RCA (Regional Cooperative Agreement for Asia and the Pacific).

Thematic Areas

Agriculture, Environmental Protection, Human Health, Industry, Radiation Protection, Energy Planning and others

No. of RCA Projects Implemented

186 (up to 2024)

Number of persons trained in regional training courses

Approximately 14,000.

Financial Resources

Technical Cooperation Fund of the IAEA and the Extra Budgetary contributions of the RCA Government Parties for regional activities, RCA Government Parties for national activities and partner organizations.

Role of the IAEA

To provide financial, administrative, and technical support to the programs and projects of the RCA.

Governance

By National RCA Representatives appointed by the Government Parties at two annual meetings.

Project Implementation

By national project teams functioning under National Project Coordinators, led by a Lead Country Coordinator

RCA website

www.rcaro.org

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R C A