IAEA 與 NEA 動態報告

2018/5/28- 6/8

報告摘要(KEY INFORMATION)

1. 國際原子能總署暨聯合國糧食及農業組織最近為強化歐洲地區對病媒傳染病之處理能力，舉辦相關會議。該會議係為國際原子能總署於 2018 年 1 月啟動之區域技術合作計畫一環，期望整合相關單位，採用核能及其延伸技術早期偵查、監測及追蹤病媒傳染病及其媒介。常使用之相關技術包含放射免疫分析(RIA)、酵素連結免疫吸附分析法(ELISA)、聚合酶連鎖反應(PCR)、基因定序。
2. 巴林與國際原子能總署於 2018 年 5 月 28 日簽署文件，就 2018 至 2023 年間建立 7 個核能技術及資源優先支援領域:1. 改善人類健康 2. 強化食物安全及農業生產力 3. 水資源管理 4. 環境保護 5. 發展再生能源 6. 核能科學及技術教育及人力發展 7. 輻射安全。
3. 介入性透視程序使醫療專家能了解病人身體狀況並及時診斷或治療。在過去 30 年來，包含使用輻射等方式，已促使醫生無須使用手術等較高風險程序去診斷或治療，並允許病人快速恢復並減少後遺症發生。隨著透視程序使用頻率增加，減少病人及醫療人員暴露於多餘輻射之需求亦增加。國際原子能總署為幫助成員國建立相關標準，於 2018 年 5 月 7 至 11 日舉辦區域訓練課程。
4. 國際原子能總署為幫助加勒比海國家因應非傳染性疾病(例如癌症、糖尿病及心血管疾病)增加情形，啟動為期 4 年之計畫，以改善輻射醫學服務。其目標係透過訓練，以改善技術，確保對病人安全有效之診斷及治療。
5. 國際原子能總署署長告知委員會如情況允許，將開始恢復核能驗證活動;另報告國際原子能總署將依據核子保防協議持續驗證及監測伊朗核子相關活動;和平用途亦是推動用途之一，如癌症仍是國際原子能總署焦點;有關核能能源領域，亦報告土耳其、阿拉伯聯合大公國、白俄羅斯及孟加拉等四國近期正在興建其第 1 座核電廠，迄今計有 59 座核能動力反應器在 17 國建造中，另 450 座核能動力反應器運作中。
6. 23 成員國之 44 位參與者自 2018 年 4 月 16 至 20 日止，參加訓練課程，以保護由國際原子能總署及國際勞工組織籌設之工廠從業人員。國際原子能總署近年來與其他國際組織緊密合作協助會員國做好輻射防護，並使得國家標準與國際標準一致。
7. 在核能署 CABRI 國際計畫架構(CIP)下，其壓水式反應器(PWR)之反應啟動事故(RIA) 首次模擬已於 2018 年 4 月 16 日在法國完成執行。CIP 計畫係當發生突發性局部性核心動力增加情形(例如控制棒退出)時，調查在壓水式反應器(PWR)中之燃料及護套行為。

國際原子能總署近日新聞

DETECTING VECTOR BORNE DISEASE: IAEA AND FAO HELP ENHANCE CAPACITY IN EUROPE

偵測病媒傳染病:國際原子能總署暨聯合國糧食及農業組織協助強化歐洲地區對其之處理能力

Mosquitoes, ticks, flies, lice, aquatic snails have a particular feature in common they can transmit disease to animals and humans. These diseases are called 'vector-borne' as their transmission occurs via a vector (a mosquito, tick, etc.) that carries and transmits the infectious pathogen into another living organism. Early detection is key to preventing disease outbreaks, and the IAEA and the Food and Agriculture Organization of the United Nations (FAO) recently held a meeting to enhance European countries' capacity in this regard.

Twenty-one specialists working in the field of veterinary diagnostics have met in Tbilisi, the capital of Georgia, at a meeting organised collaboratively by the IAEA, FAO and Georgia's National Food Agency of the Ministry of Environmental Protection and Agriculture. The goal of the meeting, held as part of a regional IAEA technical cooperation project[1], was to develop strategies for enhancing capacities to detect and differentiate vector borne diseases and to identify host vector carriers. The primary focus was on techniques for the early and rapid detection of animal and zoonotic (transmissible from animals to humans) vector borne diseases.

In recent decades, due in part to global warming and increased global travel and trade, the risk of transmission of vector borne diseases has significantly increased in regions where these were previously unknown. Recent examples of animal diseases, such as bluetongue disease, lumpy skin disease and African swine fever in Northern Europe, as well as Rift Valley fever in Africa are demonstrating these trends. Similar trends have been observed with zoonotic diseases, such as leishmaniasis, Crimean-Congo haemorrhagic fever and Middle East respiratory syndrome.

According to the World Health Organization (WHO), vector borne diseases account for more than 17% of all infectious diseases, causing more than 700 000 deaths annually. Losses in animal production caused by vector borne diseases are estimated in billions of US dollars annually.

Nuclear and nuclear derived techniques are used to detect, monitor and trace these vectors borne pathogens and their carriers. The most commonly used nuclear and nuclear derived techniques are radioimmunoassay (RIA), enzyme linked immunosorbent assay (ELISA), polymerase chain reaction (PCR) and genetic sequencing.

The regional IAEA technical cooperation project was initiated in January 2018, in partnership with FAO. It is expected to substantially improve the preparedness and response capacities of national veterinary laboratories in early and rapid detection, and of veterinary services in the timely response to priority vector borne diseases in the European region, using nuclear and nuclear-derived technologies for pathogen detection, differentiation and characterization. The countries participating in the project are IAEA Member States with officially designated veterinary laboratories responsible for the diagnosis of animal and zoonotic diseases, with a special focus on vector borne diseases.

During the meeting, the participants worked together to develop a project strategy and work plan to harmonize technologies in participating laboratories, aimed at ensuring quality, quantity and comparability of results. They also described the current capacities in their respective laboratories, as well as capacity gaps and needs.

The workshop was attended by representatives from Albania, Azerbaijan, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Georgia, Greece, Hungary, Kyrgyzstan, Latvia, Lithuania, Republic of Moldova, Montenegro, Portugal, Romania, Serbia, Slovakia, Slovenia, Tajikistan and Turkey.

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[1] RER5023, 'Enhancing National Capabilities for Early and Rapid Detection of Priority Vector Borne Diseases of Animals (Including Zoonoses) by Means of Molecular Diagnostic Tools'.

BAHRAIN SIGNS ITS FIRST COUNTRY PROGRAMME FRAMEWORK (CPF) FOR 2018–2023

巴林與國際原子能總署共同簽屬 1 份自 2018 年至 2023 年間之國家發展方案

Rana Bint Esa Bin Duaij Al Khalifa, Undersecretary, Ministry of Foreign Affairs of the Kingdom of Bahrain, and Dazhu Yang, IAEA Deputy Director General and Head of the Department of Technical Cooperation, signing Bahrain's Country Programme Framework (CPF) for the period of 2018-2022, IAEA Vienna, Austria, 28 May 2018. (Photo: D. Calma/IAEA)

Rana Bint Esa Bin Duaij Al Khalifa, Undersecretary, Ministry of Foreign Affairs, Bahrain, and Dazhu Yang, IAEA Deputy Director General and Head of the Department of Technical Cooperation, signed Bahrain's Country Programme Framework (CPF) for the period of 2018–2023 on 28 May 2018. A CPF is the frame of reference for the medium-term planning of technical cooperation between a Member State and the IAEA and identifies priority areas where the transfer of nuclear technology and technical cooperation resources will be directed to support national development goals.

Bahrain has been an IAEA Member State since 2009. Its 2018–2023 CPF identifies seven priority areas:

1. Improving Human Health
2. Enhancing Food Security and Agricultural Productivity
3. Water Resources Management
4. Protection of the Environment
5. Sustainable Energy Development
6. Education and Human Resources Development in Nuclear Science and Technology
7. Radiation Safety, Security and Legal Framework

MEDICAL IMAGING AND THERAPY WITH FLUOROSCOPY: IAEA TRAINS AFRICAN MEDICAL PRACTITIONERS FOR SAFE PROCEDURES

醫療影像及透視治療法:國際原子能總署對非洲醫療從業人員就其安全程序進行相關訓練

Participants setting up a quality assurance programme for optimization of a fluoroscopy dose at the Lady Pohamba Private Hospital. (D. Gilley/IAEA)

Interventional fluoroscopic procedures enable medical professionals to image the functioning of a patient's body in real time to diagnose or treat a medical condition. In the past 30 years, these procedures, which involve the use of radiation, have enabled physicians to diagnose and treat disease without using higher risk procedures such as surgery, allowing patients to recover faster with fewer complications.

Before fluoroscopic procedures were introduced, the use of cardiac catherization to diagnose and treat cardiovascular disease required open heart surgery. Now, diagnosis and treatment can be performed concurrently with the less invasive technology. Other fluoroscopy uses include the detection and treatment of blood clots and to the direct administration of chemotherapy to cancer-stricken organs, such as the liver.

With the increase use of fluoroscopy, the need to protect both patients and medical staff from unnecessary radiation exposure grows. To help Member States build capacity in this field, the IAEA organized a regional training course from 7 to 11 May 2018 in Windhoek, Namibia.

Medical practitioners such as radiologists, cardiologists and medical physicists responsible for radiation protection learned about good practices that ensure the safety of interventional fluoroscopic procedures. The 21 participants represented institutions in 14 African countries: Algeria, Côte d'Ivoire, the Democratic Republic of Congo, Egypt, Ghana, Mauritania, Namibia, Nigeria, Senegal, Sierra Leone, Sudan, Uganda, United Republic of Tanzania and Zimbabwe.

The course featured lectures by experienced UK and US international radiologists and medical physicists as well as discussions, exercises and study visits to the Windhoek Central Hospital and Lady Pohamba Private Hospital.

IAEA Radiation Protection Specialist Debbie Gilley, who coordinated the course, said the different backgrounds of the participants, some of whom had no radiation protection elements included in their formal education, made for vibrant discussions.

"The different professional backgrounds and experiences of participants created

a great group that will help strengthen practices in their countries with different types of resources and challenges," she said.

At the end of the course, participants presented plans to improve radiation protection of patients and workers at their medical facilities.

"For me, it was an amazing experience. I will bring the knowledge from the resourceful and rich lectures in safety back home," said Kamaldeen Olayori Jimoh, Consultant Radiologist at the National Hospital in Abuja, Nigeria.

IAEA HELPS STRENGTHEN RADIATION MEDICINE IN THE CARIBBEAN
國際原子能總署協助加勒比海國家強化輻射醫學

This week the IAEA launched a project to help Caribbean countries improve radiation medicine services. (Photo: IAEA)

The International Atomic Energy Agency (IAEA) started a four-year project to help Caribbean countries improve radiation medicine services as the region's health systems face increased pressure from non-communicable diseases such as cancer.

The project was launched at a coordination meeting in Vienna this week, bringing together participants from Antigua and Barbuda, Bahamas, Barbados, Belize, Guyana, Haiti, Jamaica, Saint Vincent and the Grenadines, and Trinidad and Tobago and experts from Cuba, Saint Lucia and Surinam. The meeting was also attended by representatives from the Pan-American Health Organization (PAHO), the International Organization for Medical Physics (IOMP), the Latin-American Association of Medical Physics (ALFIM), the American Association of Physicists in Medicine (AAPM), and the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR).

"The aim is to strengthen radiation medicine in the region, particularly in countries that have only recently become members of the IAEA," said Dazhu Yang, IAEA Deputy Director General and Head of the Department of Technical Cooperation. "The goal is to improve skills through training, with the ultimate objective of ensuring safe and effective diagnosis and treatment of patients."

Caribbean countries face several challenges in the use of radiation medicine. Most provide diagnostic services, but few offer radiotherapy treatment. Training opportunities are limited, and service delivery is complicated by the fact that the region has many islands with dispersed populations, and suffers from poor infrastructure and the risk of natural disasters.

As elsewhere in the world, the Caribbean region faces a growing burden of chronic diseases, such as cancer, diabetes and heart conditions. Radiation medicine is an important tool to fight such diseases by providing early detection and effective treatment "The health profile of the Caribbean has shifted, and non-communicable diseases are the greatest problem now," said Godfrey Xuereb, PAHO representative for Barbados and the Eastern Caribbean countries. "Breast, cervical and prostate cancers are the leading causes of death in males and females."

With a population of 110,000 people spread over 32 islands, Saint Vincent and the Grenadines joined the IAEA in

2017. The country is looking to increase access to radiation medicine, including by cooperating with neighbouring countries to share resources. “Now we only offer diagnostic and limited chemotherapy services,” said the country’s Chief Medical Officer Simone Beache. “But we lose a number of cases, even if we catch them early, because of limited access to radiotherapy.”

With few local opportunities for training and future employment, the retention of qualified personnel within the region is also a problem. Radiation medicine personnel often train, and remain, abroad. The project is looking to expand professional development opportunities, building on an IAEA-supported medical physics programme started in 2011 at the University of the West Indies in Jamaica. It will also develop e-learning tools so that professionals can keep up to date in their field.

The IAEA plans to help countries procure equipment to improve safety in the use of radiation medicine. Hard-hit by a devastating earthquake in 2010, Haiti’s ability to deliver such services has also suffered, for example. The IAEA plans an advisory mission to Haiti at the end of June to help define needs and priorities to assist the country. “Our equipment is old and needs to be replaced,” said radiologist Marie Michelle Saint Elien. “We do not have computed tomography (CT) scans in public hospitals, nor mammography machines or dosimeters.”.

Non-communicable diseases, such as cancer, are a growing global health problem placing increased pressure on countries to meet a rising demand for affordable treatment services. The IAEA works to support countries in responding to this challenge.

IAEA READY TO PLAY ESSENTIAL VERIFICATION ROLE IN NORTH KOREA, DIRECTOR GENERAL TELLS BOARD OF GOVERNORS

國際原子能署長告知委員會近期將在北韓執行重要核子驗證任務

IAEA Director General Yukiya Amano delivering his opening statement at the June Board of Governors meeting. (Photo: D. Calma/IAEA)

The IAEA is ready to resume nuclear verification activities in North Korea if political agreement makes this possible, Director General Yukiya Amano told the June meeting of the Agency's Board of Governors, which started today.

"The Agency is closely following developments related to the nuclear programme of the Democratic People's Republic of Korea," he said, referring to the country by its official name. "We continue to enhance our readiness to play an essential role in verifying the DPRK's nuclear programme if a political agreement is reached among countries concerned."

The Agency has intensified its efforts to ensure that it is ready to promptly undertake the necessary verification activities, if authorised to do so by the Board of Governors.

"I again call upon the DPRK to comply fully with its obligations under Security Council resolutions, to cooperate promptly with the Agency, and to resolve all outstanding issues, including those that have arisen during the absence of Agency inspectors from the country," Mr Amano said. IAEA inspectors were required to leave North Korea in 2009.

Iran

Mr Amano noted that the IAEA continues to verify and monitor the implementation of Iran's nuclear-related commitments under the Joint Comprehensive Plan of Action (JCPOA), signed between Iran and world powers in 2015.

"The Agency continues to verify the non-diversion of nuclear material declared by Iran under its Safeguards Agreement," he said. "Evaluations regarding the absence of undeclared nuclear material and activities in Iran continue."

Peaceful applications of nuclear technology

In his opening address, Mr Amano highlighted some of the assistance provided to Member States by the IAEA in using nuclear science and technology to improve the health and prosperity of their people.

He said cancer remained an important focus of the IAEA's work, citing recent examples of progress made in Zambia and Uganda thanks to the Agency's support. "The Cancer Diseases Hospital of Lusaka (Zambia) has become a role

model for countries in the region," he said.

In Uganda, the IAEA helped the country acquire a new Cobalt-60 machine, ensuring the restoration of radiotherapy services after a two-year interruption due to the failure of old equipment.

The Director General reminded the Board about the Ministerial Conference on Nuclear Science and Technology, which will take place in Vienna from November 28 to 30, and the annual Scientific Forum in September on Nuclear Technology for Climate: Mitigation, Monitoring and Adaptation.

He said good progress had been made in the modernisation of the IAEA's nuclear applications laboratories near Vienna and thanked the 34 Member States and other contributors which have provided over 32 million euros in extrabudgetary contributions for this work. Additional resources are still required to equip and set up the laboratories.

In the nuclear energy field, Mr Amano noted that Turkey had become the fourth country in recent years to begin construction of its first nuclear power plant, following the United Arab Emirates, Belarus and Bangladesh. Fifty-nine nuclear power reactors are under construction in 17 countries, on top of the 450 presently in operation.

Mr Amano encouraged all countries which have not yet done so to become parties to two important international nuclear safety agreements: the *Convention on Nuclear Safety* and the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.*

He also informed the Board that the third IAEA *International Conference on Nuclear Security* at ministerial level would be held in Vienna in February 2020.

IAEA AND ILO JOIN FORCE TO IMPROVE RADIATION PROTECTION OF WORKERS

國際原子能總署與國際勞工組織聯手加入勞工輻射防護改善行列

Participants from 23 Member States attended the workshop co-organised by the IAEA and the International Labour Organization (ILO) (photo: B.Okyar/IAEA).

Exposure to radiation can occur in many professions – in work associated with the different stages of the nuclear fuel cycle, for example, or when using radiation in medicine, scientific research, agriculture or industry. On 16-20 April 2018, 44 participants from 23 Member States in the Europe region have been trained to better protect workers in a regional workshop co-organised by the IAEA and the International Labour Organization (ILO). The event, which took place in Ankara, Turkey, was organized with the support of the Government of the Republic of Turkey through the Turkish Atomic Energy Authority.

The IAEA, in cooperation with the and other international organizations, works closely with Member States on occupational radiation protection of workers (also known as "occupational" radiation protection), helping countries to adopt the best practices required to bring national regulations in line with the International Safety Standards.

The workshop enabled participants to improve their understanding of the specific requirements related to planned, emergency, existing exposure situations and the protection of workers in special cases. In addition, 23 country reports on the status of their national occupational radiation protection programmes were discussed, to identify strengths, good practices and possible enhancements through the application of the Safety Standards.

"Compliance with the requirements of the International Basic Safety Standards or identical national arrangements require unique approaches for implementation," said Miroslav Pinak, Head of the IAEA's Radiation Safety and Monitoring Section (NSRW). "A key issue is the implementation of occupational radiation protection with a graded approach to control, monitor and record of occupational exposure. As more and more occupationally exposed workers support modern life in different sectors, a reliable and sustainable system has to be introduced at national and international levels."

General Safety Requirements, GSR Part 3, and the Safety Guide on Occupational Radiation Protection were the basis of the discussions and both are co-sponsored by the ILO.

Moreover, as Shengli Niu, Senior Specialist on Occupational Health of the ILO Office in Geneva said, "such

workshops facilitate the implementation of the ILO Convention No. 115 on radiation protection by the ILO constituents,”. He added that “it also increases the impact of the relevant international policies on radiation safety and protection formulated by our both organizations.”

Site visit to the Secondary Standard Dosimetry Laboratory (SSDL) at SANAEM. Participants view the x-ray calibration system operated by SSDL (photo: A.Bozkurt/ SANAEM).

The course lecturers came from Sweden and the UK, supported by IAEA and ILO representatives and experts from Turkey’s Saraykoy Nuclear Research and Training Centre (SANAEM), which hosted the event. “Technical service providers, regulatory body and end users from Turkey who participated the workshop find the chance to assess the international guide with respect to their own applications and management systems and identify their gaps, items that can be improved,” said course director Cigdem Yildiz, Head of SANAEM’s Health Physics Division.

The workshop was supported by a regional IAEA technical cooperation project[1] and is part of a series of joint IAEA/ILO regional workshops on Occupational Radiation Protection, which has included Asia and the Pacific and Africa, with a further event planned to take place in Latin America in early 2019.

Workshop participant Isabelle Baustert, a Medical Physicist at the Ministry of Health, Cyprus, noted, “Understanding radiation protection leads to understanding the need for organized institutional radiation protection, which in turn means putting an effort into implementing compliance at every level of your organisation.”

Workshop participants also visited SANAEM’s TLD individual monitoring laboratory, an approved dosimetry laboratory providing monitoring service to around 15,000 radiation workers. A visit was also organized to SANAEM’s newly established Secondary Standard Dosimetry Laboratory, which has a large calibration/irradiation capacity, including several gamma, X-rays, beta and neutron sources.

The next regional workshop on Occupational Radiation Protection will take place in Brazil in March 2019.

In their own words... hear from participants at the regional workshop

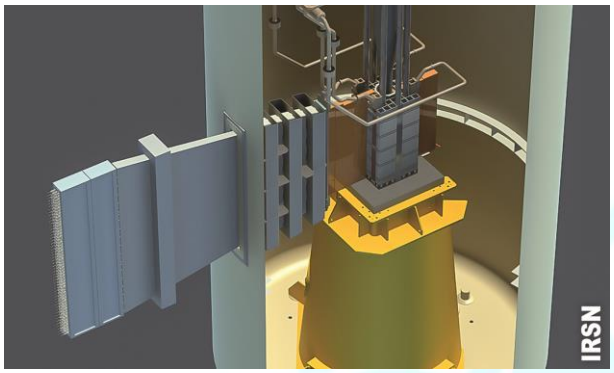
[1] RER9140, ‘Strengthening Protection of Radiation Workers and Occupational Exposure Monitoring’.

Participants from the workshop held in Ankara, Turkey, 16-20 April 2018 (photo: A.Bozkurt/SANAEM).

核能署每月新聞稿- 2018 年 5 月

First reactivity-initiated accident test completed successfully at the renovated CABRI facility

反應器啟動事故測試於法國 CABRI 設施首度完成試驗



Within the framework of the NEA CABRI International Project (CIP) a first test simulating a reactivity initiated accident (RIA) in conditions reproducing those in a pressurised-water reactor (PWR) was successfully carried out on 16 April 2018. The test was performed at the Cabri facility in Cadarache, France by the Institut de Radioprotection et de Sûreté Nucléaire (Institute for Radiation Protection and Nuclear Safety - IRSN), with the support of the French Alternative Energies and Atomic Energy Commission (CEA), in the new pressurised-water loop that was installed recently as part of a major renovation programme.

The NEA CIP Project investigates fuel and cladding behaviour in PWRs during RIAs that involve a sudden localised accidental increase of core power that would arise from, for example, control rod ejection. The CIP began in March 2000 and two RIA tests using high burn-up PWR fuel were performed in 2002 in an experimental loop filled, at that time, with liquid sodium. "After ten years of major refurbishments, the Cabri reactor is now equipped with a new configuration that will enable the NEA CIP Project to study the safety behaviour of fuels in more fully representative PWR conditions," noted the NEA Deputy Director-General and Chief Nuclear Officer Dr Daniel Iracane. "The successful completion of this test positions Cabri as a new major asset for the continuous enhancement of our knowledge base, and for the future of nuclear fuel safety worldwide."

More information on the NEA CIP project is available here.