IAEA 與 NEA 動態報告

2018/07/09 - 07/20

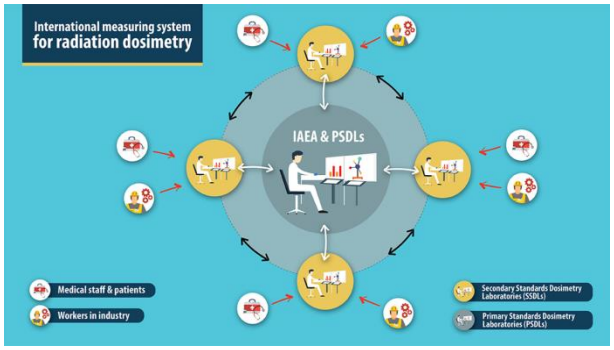
報告摘要(KEY INFORMATION)

1. 輻射劑量學係衡量輻射劑量之相關學門，對於在工業或醫學上使用輻射之工作者或暴露於醫學影像、核醫藥物或放射性治療之病患提供重要防護措施。一般而言，非經校準或比較程序，是無法確定所測出之輻射劑量是否正確。然為決定正確劑量，則應使用校準後之劑量計，其如何確保劑量計係正確並經適當校準，即屬輻射劑量學之範疇。在拉丁美洲及加勒比海國家間舉辦有史以來之第 1 次合作會議，即為尋求輻射劑量學方面之合作，以為地區患者及工作者之輻射防護奠定基礎。
2. 放射性藥物是核能醫學重要之一環，其用於診斷及治療方面。診斷性放射藥物係用來偵測腫瘤及其他健康問題;治療性放射藥物則用於安寧照護或治療病人。其中 Beta 粒子(高能量電子)放射性同位素已逾半世紀被廣泛應用，然新研究及臨床試驗指出應用 alpha 粒子(2 質子及 2 中子)在破壞癌細胞更加有效，目前被應於前列癌上之治療上。因此中歐及東歐之放射性藥劑師假國際原子能總署舉辦之課程學習治療前列腺癌之新興技術。
3. 農作物產量能透過整合式農作及家畜生產系統去回收存在於動物肥料及農作物殘留物中之營養成分，降低了合成肥料(能釋放大量溫室氣體)之需求量，進而對環境變遷改善有所貢獻。此外亦改善土讓結構，進而有能力吸收水份及保留更多營養成分，導致農作物產量增加。同位素技術係用以衡量留在泥土中之肥料量，以驗證此系統之效用。
4. 國際原子能總署啟動新的 3 年協同研究計畫，用以在核聚變能量建設過程中聚集、驗證及轉運原子、分子及電漿材料交互作用資料，期望提供有關於液體金屬上蒸氣屏蔽之重要資料集。
5. 國際原子能總署自 2018 年啟動新的 5 年協同研究計畫，以對發展中成員國建立認知並增加以加速器為基礎之分析技術影響力。加速器技術對於許多社會及技術方面發揮影響，並對於會員國之經濟發展產生貢獻。加速器之應用強化了健康、材料研究、文化遺產、環境、鑑識、能源及自然資源之革新。
6. 核子醫學在非傳染性疾病上，諸如早期偵測、治療階段以及監測病人對治療之回應，扮演重要角色。因此，國際原子能總署近期與巴西核醫組織(SBMN)簽署實質合約，期許在拉丁美洲、加勒比海及非洲葡萄牙語系國家增加有關核醫專業之訓練機會，其範圍係涵蓋兩者間之合作包含核子醫學及分子成像之訓練。
7. 核能署署長及高級人員參加由國際能源署舉辦之「核能:今日與明日」高階會議，與會者多為國際能源署成員國、業界領導者以及在能源市場闡釋核能角色之學界。

國際原子能總署近日新聞

RADIATION PROTECTION OF PATIENTS AND WORKERS: IAEA HELPS STRENGTHEN DOSIMETRY IN LATIN AMERICA AND THE CARIBBEAN

有關患者及工作者之輻射防護:國際原子能總署協助強化在拉丁美洲及加勒比附近之輻射劑量學



Dosimetry is the science of measuring radiation doses, and is crucial for protecting workers in industry, medical staff and patients. (Infographic: F. Nassif/IAEA)

The first-ever cooperation meeting between national dosimetry laboratories in Latin American and Caribbean countries has set the ground for better radiation protection of patients and workers in the region. The IAEA-led meeting, which took place in Recife, Brazil earlier this year, stimulated the development of national strategies and knowledge sharing among experts from 26 institutions in 20 countries.

Dosimetry is the science of measuring radiation doses, which is crucial for protecting workers who use radiation in industry or medicine and patients who are exposed to it through medical imaging, nuclear medicine or radiotherapy. Too little radiation can be ineffective, while too much can be harmful.

There is no metrology without calibration and comparison. We can measure the doses, but how can we guarantee that what we are measuring is correct, if we do not have anything to compare it to?

-Oscar Bordón, National Customs Administration, Paraguay

To determine the right dose, experts measure radiation with calibrated dosimeters. But to measure a dose correctly, they must also ensure that these dosimeters are accurate and have been adequately calibrated. This is what dosimetry is all about.

“In Paraguay, we are seeing a rise of patients benefiting especially from the curative powers of radiation in the medical sector. Making sure that we are using the right doses is key,” said Oscar Bordón, from the National Customs Administration in Paraguay, who participated in the meeting in Recife. “But there is no metrology without calibration and comparison. We can measure the doses, but how can we guarantee that what we are measuring is correct, if we do not have anything to compare it to?”

Calibrations are provided by Secondary Standards Dosimetry Laboratories (SSDLs) in many countries. But Paraguay is an example of a country which does not have an SSDL. While currently experts are sending dosimeters to Argentina, Brazil or Cuba for calibration, the authorities in Paraguay are planning to establish their own SSDL.

The idea behind the meeting was to assess the status of SSDLs in the region, identify gaps and needs, and strengthen cooperation among laboratories, said Nicola Schloegl, manager of this technical cooperation project at the IAEA.

"It is through encounters like these that we discover that we are not alone, that other colleagues in other countries have similar problems," said Guillermo Balay, in charge of Uruguay's SSDL. During the meeting, Balay found that some experts were interested in Uruguay's way of measuring doses from cobalt-60 irradiators and in medical imaging, methods that he is now sharing with them. Similarly, he learnt about some Brazil's efficient and low-cost solutions to guide and protect cablings used for measuring radiation with cesium-137 sources, which he will apply in his SSDL.

Experts working in laboratories in Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela attended the meeting in Recife. They were supported by experts from the National Physical Laboratory, a Primary Standards Dosimetry Laboratory (PSDL) in the United Kingdom, where the quantities used to measure radiation doses are established (see Connecting Labs).

With the support of the Department of Nuclear Energy of the Federal University of Pernambuco, Brazil, a comparison exercise was initiated at the meeting. Each participant received a dosimeter to irradiate in their SSDL with a specific dose, which they would send back to the Metrology Laboratory of Ionizing Radiation in Recife. Currently, they are verifying that all measuring capacities are comparable and in line with acceptance limits.

Similar exercises are planned in Asia, Africa and Russian speaking countries, said Paula Toroi, medical radiation physicist and SSDL Officer at the IAEA.

Participants in Recife, Brazil, check the setup of a personal dosimeter being calibrated. (Photo: P. Toroi/IAEA)

Connecting labs

Primary Standards Dosimetry Laboratories provide calibrations for the SSDLs, which is where dosimeters for end users, such as hospital staff, are calibrated. Services provided by SSDLs are a crucial element of radiation safety infrastructure — ensuring dose accuracy and traceability for the safe

use of ionizing radiation. (See infographic.)

"We are all at a different point, which is why we need collaboration," said Helen Khoury, Head of the Metrology Laboratory of Ionizing Radiation in the Department of Nuclear Energy of the Federal University of Pernambuco in Recife, Brazil, where the meeting was hosted.

In 1976 the IAEA and the World Health Organization (WHO) established the Network of Secondary Standards Dosimetry Laboratories to ensure coherence in dosimetry measurement standards internationally. The network has 85 members from 70 countries around the world. During the meeting in Recife, the second edition of the SSDL Network Charter was distributed for the first time in Spanish.

"Irradiation can produce benefits but can also have negative consequences," Khoury said. "Increasing these benefits while reducing any damage is what we're working towards."(原文鏈結)

NEW TECHNIQUE TO FIGHT PROSTATE CANCER: IAEA ORGANIZES FIRST-OF-A-KIND TRAINING FOR RADIOPHARMACISTS

對抗前列腺癌之新技術:國際原子能總署對放射性藥劑師組織了第 1 次訓練課程

For the first time, radiopharmacists from across Central and Eastern Europe learned about an emerging technique in treating prostate cancer at an IAEA course organized at the National Centre for Nuclear Research in Poland last month.

Radiopharmaceuticals are a crucial component of nuclear medicine – used for both diagnosis and treatment. They are radioisotopes bound to biological molecules, able to target specific organs, tissues or cells within the human body. Diagnostic radiopharmaceuticals are used to detect tumors and other health problems, while therapeutic radiopharmaceuticals destroy cancerous cells, improving palliative care or curing the patient – depending on the stage of their cancer.

Alpha particles have a shorter traveling range in living tissue and that is why they provide a better choice to specifically irradiate the target cells, which are usually in the range of micrometers. Amirreza Jalilian, chemist, Division of Physical and Chemical Sciences, IAEA

Radioisotopes emitting beta particles – high-energy electrons – have been the most commonly used form in radiotherapy treatment for more than half a century. However, new research and clinical trials have recently demonstrated that the application of alpha particles – two protons and two neutrons – can be more efficient in destroying cancer cells, thanks to their higher charge and mass, while sparing healthy tissue. They are used in the treatment of prostate cancer, which is the second most common type of cancer in men in the region. Prostate cancer accounts for 15% of cancers diagnosed in men globally, with almost 70% of the cases (759,000) occurring in more developed regions, including Europe, according to GLOBOCAN.

“Alpha particles have a shorter traveling range in living tissue and that is why they provide a better choice to specifically irradiate the target cells, which are usually in the range of micrometers,” said Amirreza Jalilian, a chemist at the IAEA Division of Physical and Chemical Sciences and the organizer of the workshop.

Fifteen radiopharmacists, including nine women, from Bulgaria, Croatia, the Czech Republic, Greece, Hungary, Montenegro, Poland, Romania, Slovenia, Turkey and Ukraine participated in the

five-day training. Senior experts from the IAEA, the Joint Research Centre Institute for Transuranium Elements in Karlsruhe, Germany and the European Association of Nuclear Medicine gave an overview of the latest technological advances in this field. Their presentations were followed by instructions and training on how to use these techniques.

"None of us have worked with alpha-emitting radionuclides before and for many it was also the first time working with pure beta-emitting radionuclides. Gaining this experience will help me in my work," said Dana Niculae, a radiopharmacist at the Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering in Romania.

Hitting the target

One of the main difficulties in alpha therapy is to place the alpha emitter adequately close to the target cancerous cells in order to cause the desired damage, Jalilian said. This challenge has been addressed by attaching the radioisotopes to specific targeting agents, biological molecules that can enter the cell – carrying the radioisotopes along. Ensuring the constant and guaranteed supply of alpha emitters requires international cooperation and will be the topic of an IAEA meeting in October.

"Therapeutic radiopharmaceuticals have seen a fulminant development in recent years with a high clinical impact for oncological patients. This workshop was a great opportunity for professionals from several Eastern European countries to get exposed to the most recent advances in targeted therapies with alpha and beta emitters. It was an important step towards clinical implementation of this novel, cutting-edge technology," said Clemens Decristoforo, Professor at the Medical University of Innsbruck.

The IAEA is planning to organize similar workshops in different regions. Recent IAEA coordinated research projects have been key instruments in transferring this technology to less advanced countries.

This is just one of the many ways nuclear technology is used to improve human health and quality of life – and will be one of the subjects discussed at November's IAEA Ministerial Conference on Nuclear Science and Technology.(原文鏈結)

USING NUCLEAR TECHNIQUES TO COMBAT CLIMATE CHANGE AND IMPROVE CROP YIELDS

應用核能技術以對抗氣候變遷及改善農作物產量

Cows grazing harvested paddy fields in an integrated cropping-livestock system. (Photo: M. Zaman/IAEA)

Farmers in Argentina, Brazil, India, Indonesia, Kenya and Uruguay are increasing crop yields and enhancing the fertility and quality of the soil in an environmentally friendly, cost-effective way – thanks to the results of an IAEA coordinated research project recently concluded in collaboration with the Food and Agriculture Organization of the United Nations (FAO).

"We are making the most of our resources while addressing the challenges posed by food scarcity and climate change," said Setiyo Hadi Waluyo, a scientist at the National Nuclear Energy Agency (BATAN) in Indonesia.

The work is based on a simple concept: that crop yields can be maximized through an integrated cropping-livestock production system that recycles the nutrients present in both animal manure and crop residues. This reduces the need for synthetic fertilizers that release large quantities of greenhouse gases and thereby contribute to climate change. Isotopic techniques are used to measure the amount of fertilizer in the soil and therefore the effectiveness of the concept (see The Science box).

Commercial farming operations are often based on monoculture practices, in which the same crop is grown on the same plot year after year. Monoculture over time results in lower so fertility, so excessive amounts of synthetic fertilizer are required to replenish the nutrients taken up and used by the crops.

In integrated cropping-livestock systems, which have been increasingly used over the last five years, livestock may either graze the field crops directly or may be fed the crop after harvesting. Farmers then collect the manure from the livestock and use it as fertilizer, thereby returning many of the nutrients to the soil.

"This process enriches the soil with carbon and other essential plant nutrients, drastically reducing the need for synthetic fertilizers," said Mohammad Zaman, a soil scientist at the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture. "They also improve the soil's structure, so its capacity to absorb water and conserve nutrients increases, leading to higher crop yields and to reduced greenhouse gas emissions at the same time."

In Brazil, scientists are looking for ways to maximize land use efficiency, and research into the effectiveness of using

an integrated cropping-livestock system has brought positive results. Around 5% of farms use this method, with a total of 10.6 million hectares under cultivation. "We are moving towards the implementation of conservation agriculture, and we have seen the feasibility of such an approach involving integrated cropping-livestock systems," said Jeferson Dieckow, a soil scientist from the Federal University of Paraná in Brazil. As a result, greenhouse gas emissions from urine and dung have been reduced by 89%.

Likewise, scientists in Argentina have found that the integrated cropping-livestock system makes cultivated crops more resilient to the effects of climate change. "We have benefited from this project by improving our agricultural soils through crop rotation," said Juan Cruz Colazo, a scientist at Argentina's National Institute of Agricultural Technology. "We have observed a 50% increase in organic carbon content in the soil, which enhances the resilience of the cropping system to climate variations that may otherwise impede crop yields."

In Indonesia, the population is rapidly growing and the government is working to ensure an adequate food supply. At the same time, it is committed to reducing greenhouse gas emissions by 30-40 % by 2030. "Conservation agriculture increases crop yields due to a reduction in tillage and by applying crop residues as mulch, resulting in a significant improvement in soil quality," said Hadi Waluyo. "We are planning to establish these methods on 1000 farms by 2019."

The use of integrated cropping-livestock systems, enhanced through this coordinated research project, is likely to extend far beyond the countries that participate in this project.

"What is especially encouraging about integrated crop-livestock practices is that they are not limited to certain geographical areas or climates. If land is suitable for crop cultivation, it's suitable for integrated crop-livestock practices," Zaman said.

THE SCIENCE

To measure the impact of the integrated crop-livestock systems, scientists use stable isotopes, which do not emit radiation, such as nitrogen-15 and carbon-13, on small field plots. In this way, they are able to track and analyse how efficiently crops consume nitrogen and how well carbon accumulates or is stored in the soil.

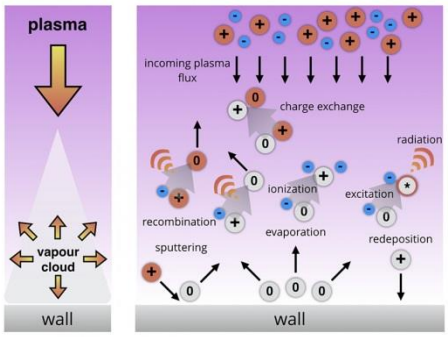
This nitrogen-15 technique involves applying small amounts of nitrogen-15 labelled fertilizer around the crops in small field plots. The scientists then observe, over a period of several months, exactly how much of this isotope is absorbed by the plants. This enables them to advise farmers on exactly how much animal manure and/or nitrogen fertilizer they need to apply under the different integrated cropping systems.

Carbon-13 is used to assess soil quality. As the soil is fertilized by the application of animal manure and crop residues, its content of organic carbon increases. By tracking the carbon-13 isotope, scientists are able to determine the sources of carbon in soil and hence the

status of the soil's fertility, again crucial to ensure the optimal application of integrated crop-livestock systems. (原文鏈結)

NEW CRP: ATOMIC DATA FOR VAPOUR SHIELDING IN FUSION DEVICES (F43024)

新協同研究計畫:在聚變裝置上之蒸氣屏蔽原子數據



An illustration of the interactions between ions and neutrals in a plasma vapour shield. (Illustration: IAEA)

The IAEA is launching a new 3-year Coordinated Research Project (CRP) in order to assemble, validate and distribute atomic, molecular and plasma-material interaction data for nuclear fusion energy development. Upon conclusion, the CRP is expected to provide an authoritative and evaluated set of data relevant to vapour shielding with particular emphasis on liquid metals.

In the magnetic confinement approach to fusion, a deuterium-tritium (D-T) plasma at a temperature of 170 million °C is trapped in a magnetic field inside a vacuum vessel. The confinement is not perfect and energy from the plasma may be directed towards the walls of the vessel due to transient instabilities in the plasma. These disruptions can lead to unwanted damage such as evaporation or ablation to the wall, and their mitigation is an important and ongoing field of research in the development of experimental fusion reactors such as ITER and DEMO.

When wall material is evaporated in this way, it forms its own dense expanding plasma in front of the wall surface which can, in some circumstances, reduce the further energy absorbed by the wall. This effect is referred to as *vapour shielding* and must be properly understood to accurately estimate the wall material's lifetime. However, there are major gaps in the atomic and molecular data necessary to model the effects of vapour shielding. This CRP will address some of those gaps and help the community in assessing the viability of different materials for use in fusion reactor components, particularly the innovative use of materials such as liquid metals.

The IAEA is uniquely placed to facilitate global, collaborative research of the kind needed to provide and evaluate data for fusion. In bringing experimentalists and theorists producing fundamental atomic and molecular data together with fusion researchers and plasma physicists, this CRP will enable international cooperation on a scale that is otherwise hard to achieve and can host the resulting data in a permanent and trusted repository.

CRP Overall Objective:

The primary goal of this CRP is to increase the capability of Member States to undertake fusion plasma and fusion materials modelling by supporting the development of novel techniques in fusion reactor design. This will be accomplished through the enhancement of the global

knowledgebase of atomic and molecular data for vapour shielding modelling, with a particular focus on liquid metals.

Specific Research Objectives:

- To assemble, evaluate and recommend atomic and molecular data needed for the modelling of vapour shielding, particularly cross sections for ionization, recombination, charge exchange (CX), rovibrational excitation (for molecules) and momentum transfer. Also of concern are data for radiative processes inside vapours, including line shapes, emission and absorption coefficients, radiative cooling rates, stopping power, and other radiative properties of warm dense matter. The comparison of theory with experiment should be achieved wherever possible.
- To assess the impact of impurities such as oxygen (O), carbon (C) and nitrogen (N) in their interactions with liquid metal species, particularly lithium (Li).
- To assemble, evaluate and recommend relevant data on metal hydrides for vapour shielding models, particularly those involving Li and Tin (Sn).
- To investigate the effect of surface chemistry, especially hydrogen co-deposition, on sputtering and evaporation of plasma-facing materials.

How to join the CRP:

Please submit your Proposal for Research Contract or Agreement by email to the IAEA's Research Contracts Administration Section using the appropriate template on the CRA website.

For further information related to this CRP, potential applicants should write to the Research Contracts Administration Contact Point. (原文鏈結)

NEW CRP: FACILITATING EXPERIMENTS WITH ION BEAM ACCELERATORS (G42008)

新協同研究計畫:離子束加速器之促進實驗

The structure of an ion beam accelerator at a laboratory belonging to the Lebanese Atomic Energy Commission. (Photo: Lebanese Atomic Energy Commission)

The IAEA is launching a new 5-year Coordinated Research Project (CRP), starting in 2018, which aims to build awareness and increase the impact of accelerator-based analytical techniques in developing Member States.

Accelerator-based technologies are associated with a broad range of applications which have societal and technological impacts, and can contribute to the economic development of Member States. The utilisation of accelerators enhances innovation in areas such as health, materials research, cultural heritage, environment, forensics, energy and natural resources.

Although IAEA developing Member States recognize accelerator technologies as one of the key possibilities to serve research as well as social and economic development, many of them still face difficulties allocating the requisite funds for the installation and effective operation of accelerator facilities. As a result, researchers from these Member States often lack the necessary support to employ accelerator-based techniques, or their access to accelerator facilities remains very limited.

The aim of this CRP is therefore to facilitate scientists without access to accelerator facilities to conduct experiments using accelerator-based ion-beam analytical techniques. This will be accomplished through the identification and selection of participating institutions (hosts) which will provide access to ion beam laboratories and expertise in ion beam analytical techniques, and awarding technical contracts and research agreements accordingly. The scientists previously without access (guests) will thus derive benefits from access to related analytical and irradiation techniques, as well as will build the necessary capacity if such facilities were planned in their countries in the future.

The project will further promote new collaborations and networking among researchers, accelerator specialists and other stakeholders interested in the accelerator-based analytical techniques.

CRP overall objective:

The primary goal of this CRP is to boost the impact of accelerator-based analytical techniques in developing IAEA Member States by increasing the number of users of ion beam

accelerator facilities for analytical and irradiation purposes, as well as for regional capacity building.

Specific research objectives:

- To facilitate scientists lacking access to accelerator facilities to conduct experiments using accelerator-based ion beam techniques;
- To encourage young scientists to associate their research with accelerator-based ion beam analytical techniques as part of their MSc and PhD research;
- To help transfer the knowledge, skills and experience in specific accelerator-based ion beam analytical techniques to developing Member States.

How to join the CRP:

Please submit your Proposal for Research Contract or Agreement by email to the IAEA's Research Contracts Administration Section, using the appropriate template on the CRA website.

For further information related to this CRP, potential applicants should write to the Research Contracts Administration Contact Point. (原文鏈結)

IAEA PARTNERS WITH BRAZIL'S SBMN TO FACILITATE TRAINING FOR NUCLEAR MEDICINE PROFESSIONALS IN LATIN AMERICA, THE CARIBBEAN AND PARTS OF AFRICA

國際原子能總署夥同巴西 SBMN 促進對拉丁美洲、加勒比海及部分非洲國家核醫專業之訓練

Aldo Malavasi, Deputy Director General and Head of the IAEA Department of Nuclear Sciences and Applications (right) and Juliano Cerci, President of the Brazil-based Sociedade Brasileira de Medicina Nuclear sign the practical arrangement on 18 July 2018. (Photo: D. Calma/IAEA)

The IAEA signed a practical arrangement today with the Brazil-based *Sociedade Brasileira de Medicina Nuclear* (SBMN) which will increase training opportunities for nuclear medicine professionals in Latin America and the Caribbean (LAC), as well as in Portuguese-speaking African countries.

While in the past both organizations have worked together in the areas of nuclear medicine and molecular imaging, the practical arrangement – the first of its kind to be signed by the IAEA in Latin America – will now define and formalize this collaborative relationship.

"Brazil provides an ideal backdrop to the partnership arrangement as the country is home to the largest number of nuclear medicine centres in the Latin American and Caribbean region, hosting several state-of-the-art facilities relating to all areas of nuclear medicine," said Diana Paez, Head of the Nuclear Medicine and Diagnostic Imaging Section of the IAEA's Division of Human Health. "It also offers an excellent variety of training programmes and a robust community of high-level experts."

According to the World Health Organization, cancer and cardiovascular diseases, both of which are classified as non-communicable diseases (NCDs), are among the leading causes of death in the world. Of 56.4 million global deaths in 2015, 17.7 million were attributed to cardiovascular diseases, while 8.8 million were due to cancer. Furthermore, the number of patients affected is on the rise due in part to increasing lifespans as well as changes in lifestyle. Nuclear medicine plays an important role in the care of such NCDs, from their early detection, through the treatment phase and later, in monitoring patient responses to treatment.

The scope of the practical arrangement will cover collaboration between the two partners in the further training of nuclear medicine and molecular imaging professionals, and those from related disciplines, in IAEA Member States. In particular, it will target professionals from the LAC region, as well as Portuguese-speaking African countries. As part of their cooperation, the IAEA and the SBNM will identify high-level clinical centres or universities for the

training of nuclear medicine professionals and fellows. They will also provide expertise and other training-related support aimed at further building capacity in this field. Finally, they will help with the identification of high-level clinical centres suitable for participation in IAEA Coordinated Research Projects.

"The agreement will build an official bridge to the path of collaboration," said Juliano Cerci, President of the SBMN. "We hope to strengthen the fields of research and learning, but also practical issues like regulation and formal education."

For more than 50 years, the SBMN has been a leading organization in the field of molecular imaging and nuclear medicine in Brazil, working to promote and expand the knowledge, use and access to nuclear medicine in the country. Its mission is to promote, support and stimulate the progress, improvement and dissemination of nuclear medicine as well as related sciences and disciplines in the scientific, ethical and economic fields.

"The IAEA is pleased to formalize our collaborative relationship with the SBMN," said Aldo Malavasi, Deputy Director General and Head of the IAEA Department of Nuclear Sciences and Applications. "This practical arrangement is the first of its kind in Latin America and the Caribbean and will bring together the IAEA's institutional reach and the SBMN's expertise in nuclear medicine, enabling enhanced training opportunities and capacity building throughout the region. Cooperation between the IAEA and professional organizations is essential to expand the support for both the Agency's work, outreach and impact."

From left to right: Raul Ramirez Garcia of the IAEA's Department of Technical Cooperation, Enrique Estrada-Lobato of the IAEA's Division of Human Health, Juliano Cerci, President of the Brazil-based Sociedade Brasileira de Medicina Nuclear (SBMN), Aldo Malavasi, Deputy Director General and Head of the IAEA Department of Nuclear Sciences and Applications, and Diana Paez of the IAEA's Division of Human Health, following the signing of a practical arrangement formalizing collaborations between the two organizations. (Photo: D. Calma/IAEA) (原文鏈結)

章節: IAEA Partners with Brazil's SBMN to Facilitate Training for Nuclear Medicine Professionals in Latin America, the Caribbean and Parts of Africa

核能署每月新聞稿-2018 年 7 月

The NEA participates in high-level IEA meeting on the future of nuclear

核能署就核子未來議題參加國際能源署高階會議

NEA Director-General Magwood and senior staff participated in a high-level meeting entitled "Nuclear Energy: Today and Tomorrow", organised by the International Energy Agency (IEA) on 28 June 2018 in Paris, France. The event brought together high-level participants from IEA member countries, industry leaders and academia who examined the role of nuclear energy in mature power markets, as well as its implications for energy security, the economy and the environment. "A consideration of the future of nuclear energy is complex not only because of technology and economic factors, which the NEA analyses closely on an ongoing basis, but also because of how it is reflected in global and national policy and politics," said NEA Director-General Magwood at the meeting. During his speech, he also underlined the social and environmental factors of electricity provision, which affect individuals, economies and countries in ways that are not captured in market prices. He noted that the full costs of electricity generation must remain firmly on the radar of energy policy makers. (原文鏈結)