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ONLINE LECTURE: HOW TO MINIMIZE RADIATION EXPOSURE OF CHILDREN WITH HEART DISEASES

如何最大幅度地減少患有心臟疾病的兒童的醫療輻射暴露

The tenth IAEA webinar on radiation protection in medicine, to be held 9 May, focuses on a particularly vulnerable patient group: children with heart disease.

Heart diseases, either congenital or acquired, are often difficult to diagnose or treat. The treatment is even more complex when it comes to the most sensitive group of patients, children. Congenital heart disease, which is caused by abnormal heart development before birth, is an important cause of childhood deaths. It affects

報告摘要(KEY INFORMATION)

1. 患有先天或後天性心臟病的兒童通常需要暴露於相對較多數量的輻射醫學診斷，國際原子能總署輻射防護研討會專業人員將致力於簡化醫學成像程序，以確保降低病患輻射劑量。
2. 隨著電力消費預計在未來幾年將大幅增加，而且高度依賴進口能源，摩洛哥正在評估核電是否可以成為其 2030 年能源結構的選擇。
3. 國際原子能總署核應用實驗室的現代化計畫進入新階段，新的實驗室大樓 （FML）開始建構工程，未來實驗室將聯合管理包含食品和環境保護實驗室（ FEPL）、土壤和水管理與作物營養實驗室（SWMCNL）及動物生產與健康實驗室（APHL）。
4. 蒲隆地(BURUNDI)政府接受世界衛生組織（WHO）和國際癌症研究機構聯合評估團提出的建議，力圖加強其國家癌症防治方案。
5. 約旦癌症中心（KHCC）得到國際原子能總署的支持，採用先進核子醫學技術，每年診斷和治療 4000 至 5000 名新增癌症病例。
6. 核能署和中國國家能源局簽署了「和平利用核能備忘錄」，該協議預計將在核能開發，核能安全研究和輻射防護等領域開展合作。
7. 能源署-核能開發部高級核能分析師兼代理主管致力於推動韓國與 NEA 之間的合作，榮獲韓國科技部信息通信技術和未來計劃部門之核能工業國際合作優秀獎。

up to almost eight out of every 100 live newborns, according to the World Health Organization. In addition, one out of 100 000 children and adolescents fall ill with heart disease every year.

Children with congenital or acquired heart disease often require complex medical care with long hospital stays and repeated surgeries. The complexity of their care dictates that they are regularly exposed to a relatively high number of diagnostic medical imaging procedures involving ionizing radiation. Image-guided interventional procedures using X-rays also have become important in the care of these children, with the average number of exposures per patient increasing over the past two decades.

Although these diagnostic and therapeutic procedures greatly contribute to better health for children with congenital and acquired heart disease, their cumulative ionizing radiation dose remains a concern. Health professionals strive to optimize any medical imaging procedures to ensure that radiation doses are "As Low As Reasonably Achievable". The upcoming IAEA webinar aims to support health professionals in this work.

What can you learn?

Every diagnostic medical procedure involving ionizing radiation needs to minimize radiation exposure without compromising the benefit for the patient. This process, called optimization, is one of the most important principles of radiation protection of patients.

During the online lecture, Professor Kevin Hill from the Duke University Medical Center in Durham, USA, will introduce how to optimize imaging procedures, including fluoroscopically guided procedures, computed tomography (CT) and nuclear medicine studies. Participants will learn how to best proceed without compromising quality or safety of the procedures. Professor Hill will also discuss major sources of cumulative radiation exposure and potential risks of these procedures in children.

The webinar is held in cooperation with the Image Gently Alliance, a coalition of health care organizations dedicated to providing safe, high-quality paediatric imaging worldwide.

How to participate

Register online and join us on Tuesday, on 9 May 2017.

Registered participants will receive an email with a hyperlink that will be activated just before the webinar. Participation is free and possible from computers as well as mobile devices. The platform has a dedicated area where participants can submit questions.

About the IAEA RPOP webinar programme

The IAEA in 2016 launched an initiative offering free online lectures conducted on topics in radiation protection in medical uses of ionizing radiation. Since then, more than 1,200 people from 90 Member States have participated. Past webinars can be viewed here.

MOROCCO CONSIDERS NUCLEAR POWER IN FUTURE ENERGY MIX

摩洛哥考慮在未來能源混合體制中加入核能

With its electricity consumption expected to increase considerably in the coming years and with a high dependence on imported energy sources, Morocco is evaluating whether nuclear power could be an option for its 2030 energy mix. Affordable and clean energy is vital to meeting Morocco's growing electricity demand to sustain its socio-economic development.

" Morocco's national energy strategy is considering nuclear power as a long-term alternative to meet the country's future needs, but no decision has been made so far," said Khalid El Mediouri, Director General of the National Centre for Nuclear Energy, Sciences and Technology Techniques (CNESTEN) and Chair of the Nuclear Power and Seawater Desalination Committee (CRED), set up in 2009 by the Ministry of Energy, Mines, Water and Environment. "For this purpose, we undertook a global evaluation of these conditions alongside the infrastructure required for a nuclear power project compliant with international standards."

Today, nearly 30 countries around the world are considering or actively embarking upon such a programme. The IAEA helps these countries build their knowledge in energy planning, analysis and nuclear expertise. In the past two years in Africa, the IAEA has conducted four Integrated Nuclear Infrastructure Review (INIR) missions to Ghana, Kenya, Morocco and Nigeria.

In October 2015, Morocco hosted an INIR mission and developed an action plan to address the mission's recommendations and suggestions.

"Morocco recognizes the importance and the usefulness of the IAEA's Milestones approach and its associated technical assistance programmes," El Mediouri said, referring to an IAEA methodology that guides countries and organizations to work in a systematic way towards the introduction of nuclear power. "Through the integrated work plan, the IAEA continues its valuable assistance for the implementation of the INIR mission recommendations. This supports further progress in Morocco's nuclear infrastructure development."

Nuclear technology for socio-economic development

Morocco has participated actively in the IAEA technical cooperation programme to strengthen its capacities for the peaceful use of nuclear technology. Multiple projects have helped the country build local capabilities in conducting an energy planning study and nuclear power assessment. The country is also benefiting from an IAEA coordinated research project that helps decision makers consider all energy supply technology options.

The country's experience with nuclear technology dates back to the 1950s: it has used nuclear techniques in medicine, agriculture and industrial applications. Under the supervision of CNESTEN, Morocco operates the MA-RA1 research reactor at the Maâmora Nuclear Research Centre. It is used for research in nuclear energy, neutron activation analysis, geochronology research, education and training.

Morocco is playing an important role in strengthening South–South cooperation by providing IAEA-supported education and training for African countries, mainly through regional designated centres in the fields of radiation safety, radiotherapy, nutrition, non-destructive testing and water resources.

IAEA energy planning tools help evaluate options

At the request of a Member State, the IAEA provides guidance and technical support for evaluating energy options, including nuclear energy. While this can contribute to sustainable development, the IAEA does not influence Members States' choice of energy options. Its energy planning approach provides an opportunity to evaluate all energy options equally.

Integrated Nuclear Infrastructure Review (INIR)

The Integrated Nuclear Infrastructure Review (INIR) is a holistic peer review to assist Member States in assessing the status of their national infrastructure in respect of the introduction of nuclear power. The review covers the comprehensive infrastructure required for developing a safe, secure and sustainable nuclear power programme.

Upon request from a Member State, the IAEA conducts an INIR mission, sending a team of international experts who have direct experience in specialized nuclear infrastructure areas, and also IAEA staff. Before receiving an INIR mission, the country must complete a self-evaluation of the 19 nuclear power infrastructure issues included in the IAEA's 'Milestones' approach, a comprehensive methodology that guides countries and organizations to work in a systematic way towards the introduction of nuclear power.

INIR missions enable IAEA Member State representatives to conduct in-depth discussions with international experts about experiences and best practices in nuclear power infrastructure development. Recommendations and suggestions are provided in a report to the Member State. By providing a comprehensive assessment of all facets of a nuclear power programme, spanning the regulatory body, utilities and all relevant government stakeholders involved, INIR helps ensure that the infrastructure required for the safe, secure and sustainable use of nuclear power is developed and implemented in a responsible and orderly manner.

For more information about the International Conference on the IAEA Technical Cooperation Programme: Sixty Years and Beyond – Contributing to Development, click here.

IAEA LABORATORY MODERNIZATION REACHES NEW STAGE WITH START OF FLEXIBLE MODULAR LABORATORY CONSTRUCTION

國際原子能總署現代化策略隨著新型實驗室的建造開始新階段

At the end of April the next major component of the IAEA's modernization efforts for the Nuclear Applications (NA) laboratories in Seibersdorf switched into high gear with the start of excavation works for the second new laboratory building— the Flexible Modular Laboratory (FML). The enabling works and basic ground engineering work were carried out at the end of last year.

Progress for both new laboratory buildings under construction – the FML and the Insect Pest Control Laboratory (IPCL) - continues smoothly, on time and on budget.

The FML is intended to house three laboratories managed jointly by the IAEA and the Food and Agriculture Organization of the United Nations (FAO) as part of the Joint FAO/IAEA Programme on Nuclear Techniques in Food and Agriculture: the Food and Environmental Protection Laboratory (FEPL), the Soil and Water Management and Crop Nutrition Laboratory (SWMCNL) and the Animal Production and Health Laboratory (APHL). The FML is designed to provide these three laboratories with enhanced laboratory and training capabilities.

Construction for two of the three laboratories – the FEPL and the SWMCNL - is already fully funded, while the APHL still requires an estimated €5.7 million in extrabudgetary funds for its completion. To proceed on schedule with the ongoing construction and to maximize cost efficiencies, €1 million is needed by June 2017, and the remaining €4.7 million by September 2017. The first two laboratories of the FML are planned for completion in mid-2018 while the APHL laboratory is scheduled for completion by December 2018, subject to the availability of funds.

The APHL does valuable work to help Member States improve their livestock production and prevent the spread of animal and zoonotic diseases, which are diseases that can be transmitted from animals to humans. In many Member States, livestock play a critical socioeconomic role in rural communities and national economies, and preventing the spread of diseases helps to protect livelihoods and support food security.

In recent years, Member State demands for emergency assistance from the APHL have grown rapidly: For example, in 2015 the APHL helped Member States respond to an outbreak of the Ebola virus and avian influenza strain

HPAI-H5N1 in West Africa. In 2016, the APHL extended support to Member States coping with outbreaks of the Zika virus in Latin America, lumpy skin disease and African swine fever in Eastern Europe, Peste des Petits Ruminants (PPR) in Asia and Africa, avian influenza strain HPAI-H7N9 in Asia and avian influenza strain HPAI-H5N8 in Asia, Europe and North Africa.

The APHL, in collaboration with the IAEA Technical Cooperation Department and FAO, recently conducted a training course in Seibersdorf on nuclear and nuclear-related techniques to quickly and effectively detect the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) in camels. MERS is an emergent and potentially fatal virus reported primarily in Saudi Arabia and the wider Gulf region that causes severe respiratory illness in humans, with a mortality rate above 35% according to the World Health Organization (1,955 human cases confirmed, including 742 fatalities since 2012). As camels carry the virus without presenting any clinical signs, or only very mild signs, humans can be infected without warning. Therefore, MERS-CoV normally can only be detected after human infection and by applying advanced laboratory techniques. The techniques that were presented in the APHL's training course can be used for active and passive surveillance of camel populations to identify the presence of the virus before humans are infected. Sixteen scientists from Bahrain, Iraq, Kuwait, Lebanon, Saudi Arabia, and the United Arab Emirates were represented in the training course.

Provided that the necessary funding is secured, the new laboratory space in the FML will help the scientists of the APHL to deliver improved services to help Member States increase animal production and more effectively control transboundary animal and zoonotic diseases.

BURUNDI POISED TO STRENGTHEN ITS NATIONAL CANCER CONTROL CAPACITIES

蒲隆地加強其國家癌症控制能力

The Government of Burundi seeks to strengthen its national cancer control programme, while taking into account recommendations made during a recent joint assessment mission by the International Atomic Energy Agency (IAEA), the World Health Organisation (WHO) and the International Agency for Research on Cancer (IARC).

"Our priorities are to establish a national, multi-sectoral committee to review our strategic cancer control plan and to mobilise the human and financial resources necessary to provide adequate cancer care," said Dr Innocent Nkurunziza, the National Programme Director for the Integrated Fight Against Non-Communicable Diseases and President of the Thematic Group on Cancer at the Ministry of Public Health.

Burundi is one of Africa's smallest and most densely populated countries, and cancer increasingly affects the population. According to IARC, each year, over 7,000 Burundians develop the disease and almost 6,000 die from it. Both figures are projected to rise by around 85% by 2030. At the same time, public awareness about cancer remains low and the majority of patients seek medical attention when their illness is already too advanced to be cured.

To better understand the country's cancer situation, the Government of Burundi requested an assessment of its national capacities to control cancer through an "imPACT Review" conducted by the IAEA in cooperation with WHO and IARC. A team of international experts nominated by the participating Agencies visited public and private health care facilities, medical schools and non-governmental organisations (NGO) working on cancer in the capital Bujumbura and the cities of Kayanza and Mpanda. The experts appraised the status of cancer prevention, early diagnosis, treatment and palliative care, as well as of the national cancer planning and cancer registration system. In addition, the levels of safety and security of radiation medicine for health care workers and patients were evaluated.

Out of the more frequent cancers in Burundi, cervical and oesophageal cancers and Kaposi Sarcoma are highly preventable, while effective control of breast cancer and non-Hodgkin lymphoma predominantly depends on the early detection and appropriate treatment of the relevant tumors. In Burundi, the limited access to effective prevention measures as well as early detection and treatment services significantly reduces patients' chances of survival.

While the Government is gearing up to address the growing needs, several NGOs have been undertaking prevention or screening activities for years. For example, the Association Burundaise pour le Bien-être Familial (ABUBEF) runs 7 clinics nationwide offering breast and cervical cancer screening, and referring women screened positive to gynaecologists for confirmation of the diagnosis and treatment, if needed. "We have been running a cervical cancer screening programme here since 2014. During a recent campaign, we screened 189 women in one week and trained 17 medical doctors in screening and treatment of pre-cancer lesions with cryotherapy," said Donavine Uwimana, ABUBEF's Executive Director.

The Government plans to establish radiotherapy and nuclear medicine facilities with the support of the IAEA in the coming years. The imPACT experts recommended that Burundi builds and strengthens the corresponding health care workforce as a matter of priority, particularly in

relation to cancer prevention, early detection and palliative care.

The experts observed further that a National Cancer Control Programme 2016 to 2020 is in place. Its implementation is challenged though by competing health priorities, such as HIV/AIDS, tuberculosis and malaria. The team also highlighted the need for strengthened cancer data to support prioritisation and informed decision-making.

"There is a need for continuous action to counter the suffering and economic hardship caused by cancer. The recommendations of the imPACT review mission will greatly enhance the ability of Burundi's health system to take a comprehensive approach in delivering cancer services" said Dr Nkurunziza.

RADIATION MEDICINE AND TECHNOLOGY HELP COMBAT CANCER IN JORDAN

約旦輻射醫學技術協助治療癌症

Three words — You Have Cancer — can dramatically change your life. At the King Hussein Cancer Center (KHCC) in Amman, Jordan, 4 000 to 5 000 new cancer cases are diagnosed and treated each year. The KHCC is a leading hospital in the Middle East treating cancer patients from the region, with a third of its patients coming from abroad. The hospital uses nuclear medicine and advanced technology for diagnosis and treatment, and received support from the IAEA.

"The KHCC provides adult and paediatric patients with advanced comprehensive cancer care for all types of cancer," said Akram N. Al-Ibraheem, Chairman of the hospital's Nuclear Medicine Department. "We have diagnostic equipment that includes PET-CT as well as SPECT to track and identify this dreadful disease."

Techniques and technologies of radiation medicine — which include the disciplines of nuclear medicine, diagnostic radiology and radiotherapy — offer effective means to combat cancer.

They offer unparalleled benefits, enabling insights into physiological function, biological

processes and morphology that provide more specific information about organ function and disease, Al-Ibraheem highlighted.

"The cure rate among cancer patients is strongly dependent on the stage of the disease at the time of its diagnosis, so early detection remains key," Al-Ibraheem said, adding that the IAEA has supported the purchase of diagnostic equipment, including the installation of a new generation SPECT-CT equipment by the end of 2017.

Having advanced medical equipment on its own is not enough: equally vital is providing necessary training to medical personnel, he said, adding that it is in this area that IAEA technical cooperation has been crucial. "Collaboration to increase expertise has not only benefitted Jordanian medical professionals but also others in the region."

Spread the word

Raising awareness on how nuclear medicine can help in cancer treatment is not easy in countries where 'cancer' remains a taboo word. The KHCC's public awareness campaign has various outreach programmes to promote the motto 'right diagnosis is half way to the right treatment', Al-Ibraheem said. It hosts workshops and reaches out to local civic bodies as part of its efforts to build public awareness on the importance of early detection and prevention and to raise funds to help support the KHCC.

Tackling cultural and social stereotypes on cancer and encouraging people to get tested go hand-in- hand, he said. Recovering patients and their families also play an influential role in spreading the word on how 'new technology' helps to combat cancer, he explained.

Precise training in nuclear medicine and diagnosis

As part of its efforts to ensure high quality medical staff, the KHCC has a dedicated training centre that offers education and training on nuclear medicine and diagnosis among other disciplines in cancer care.

The training centre offers medical and non-medical courses to both KHCC staff and health care professionals from across the country and the region. It includes a fully comprehensive oncology nursing education programme, which provides detailed guidelines and procedures on the safe use of nuclear medicine and diagnostic equipment. "Our aim is to make sure that procedures involving PET-CT scan, SPECT and theragnostic are undertaken with outmost caution and care," Al-Ibraheem said. Benefits are many but if proper procedures are not followed, there are significant risks to patient safety, he added. "Theragnostic technologies include nano-based procedures to improve imaging and therapy, and offer cutting edge biomedical health care products and services."

Safety issues as regards radiation medicine relate to radiation exposure of patients and staff involved in the delivery of health care services. To ensure maximal benefits and minimal risks, it is essential that the nuclear applications in medicine rely on guaranteed attention to all aspects of radiation safety,

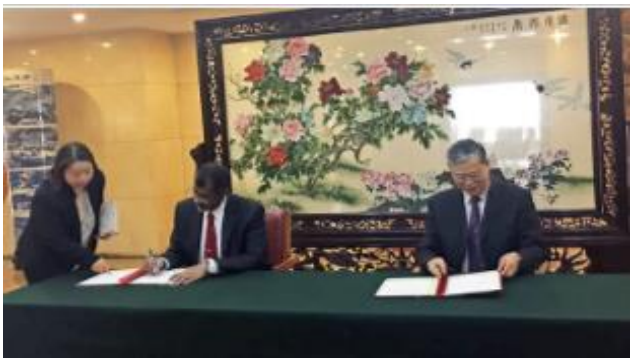
adequate dosimetry and quality assurance procedures. They will largely limit the risk of undue radiation exposure to workers and the public, and dose mis-administration to patients.

NEA MONTHLY NEWS BULLETIN - MAY 2017

核能署每月新聞稿 - 2017 年 5 月

NEA AND CHINA'S NATIONAL ENERGY ADMINISTRATION SIGN MOU TO STRENGTHEN CO-OPERATION

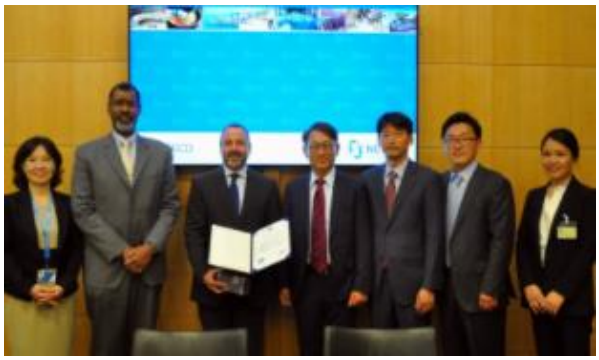
核能署和中國國家能源管理局簽署備忘錄加強合作



On 28 April 2017, the NEA and the National Energy Administration of China (C/NEA) signed a Memorandum of Understanding (MOU) in the Field of Peaceful Uses of Nuclear Energy, enhancing co-operation between both parties. An official ceremony was held in Beijing, China, at which C/NEA Deputy Administrator Li Fanrong signed the MoU on behalf of the C/NEA and NEA Director-General William D. Magwood, IV, signed on behalf of the NEA. The agreement foresees co-operation in a number of fields, including nuclear energy development, nuclear safety research and radiological protection. The memorandum of understanding between the NEA and the C/NEA represents further progress in the growing collaboration between China and the Agency, and complements the memorandum of understanding signed by the NEA and the National Nuclear Safety Administration (NNSA) of China in 2014 and the Joint Declaration on Co-operation signed by the NEA and the China Atomic Energy Authority (CAEA) in 2013.

NEA EXPERT RECEIVES AWARD FOR INTERNATIONAL CO-OPERATION FROM KOREA

核能署專家在韓國獲得國際合作獎



Dr Henri Paillère, NEA's Senior Nuclear Analyst and Acting Head of the Division of Nuclear Development, has been honoured with the Award for Person of Merit for International Co-operation in Nuclear Industry by the Korean Ministry of Science, ICT and Future Planning. The honour was awarded in recognition of Dr Paillère's dedication and service for the promotion of co-operation between Korea and the NEA, including through his work in support of the Generation IV International Forum (GIF) and the International Framework for Nuclear Energy Cooperation (IFNEC). "We are very pleased to see Dr Paillère's accomplishments being acknowledged," NEA Director-General Mr Magwood said. "We are very fortunate to have outstanding people like Henri at the Agency."