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Benefit Exchange

A newsletter of *Medical Physics for World Benefit*

Medical Physics for World Benefit
www.MPWB.org
Working together for effective patient care

Inside This Issue

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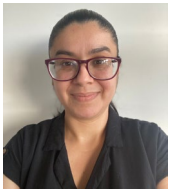

Dr. Mariela A. Porras-Chaverri

Mr. Arias-Obregón is a Communications student at UCR and the project assistant of IAVE since 2019. Dr. Porras-Chaverri is an Associate Professor at the School of Physics at the University of Costa Rica.

Introduction

Greetings Physicists! To facilitate and encourage collaboration, we seek contributions describing both MPWB-affiliated and non-affiliated projects and updates that may be of interest to our readership. Examples include the work of IAEA, various international professional societies (ALFIM, FAMPO, *et al.*), non-governmental organizations such as Radiating Hope, Rad Aid, and other institutional teams. Our newsletter aims to highlight and connect individuals and organizations involved in improving physics in medicine internationally.

Global Awareness: Costa Rica

In this issue two guest contributors from the University of Costa Rica (UCR), **Lander Arias-Obregón** and **Mariela Porras-Chaverri, PhD** help shine a spotlight on Costa Rica as part of our ongoing effort to increase global awareness and international collaboration in Medical Physics.

Costa Rica is an autonomous and democratic country located in Central America. It borders the sister nations of Nicaragua in the north and Panama in the south. The biggest industry is tourism, due to the natural beauty and wide biodiversity in the country. It has a population of approximately 5.1 million habitants, with a life expectancy of 80 years, and a land area of roughly 51,000 km^2 (a little smaller than West Virginia, and a little larger than Denmark).

Costa Rica has a publicly funded social security system, *Caja Costarricense de Seguro Social* (CCSS, Costa Rican Social Security Fund), or La Caja, as it known. *La Caja* is a unique and complex social security institution. It not only consists of a single-provider national network of 27 hospitals and over 1000 clinics, but it also manages the disability pensions and pensions for the dependents of a deceased workers, as well as maternal leave payments and other social security expenses. It is the largest provider of healthcare services in the country and covers approximately 90% of the population.

Enrollment is mandatory for all individual salaried workers, and benefits include their dependents as well. It is funded through a solidarity-based system, with a set of uniform payroll taxes for both the worker and the employer. There are no additional healthcare costs besides the monthly tax, all healthcare expenses are covered, including all available procedures and medication, with no caps or copayments. Children under 18 and pregnant women are covered regardless of enrollment or immigration status.

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New MPWB Board Members

MPWB is pleased to announce the new incoming 2023 Board Members, **Afua Yorke, PhD,** as Vice-President and **Monique van Prooijen, PhD,** as Secretary-Treasurer.

Dr. Yorke is an assistant professor in medical physics at the University of Washington, Seattle. An active contributor of the AAPM International Council, Dr. Yorke serves on several committees and subcommittees. She has won several awards for her work which focuses on global health and equity.

Dr. van Prooijen is a staff physicist at Princess Margaret Cancer Centre where she has held an appointment since 2001. An active member of the University Health Network's outreach program, Dr. van Prooijen has led several efforts to improve cancer care education and development in Kuwait and Kenya. Her work includes initiation of a peer support group for Kenyan physicists.

Left, Afua Yorke, PhD. Right, Monique van Prooijen, PhD

Cancer Care during Crisis; Ukrainian War

What if you worked in a radiation oncology department scanning injured patients with a CT simulator, every day as a radiation therapist, or performed surgery while worrying about your son and husband who are battling Russian invaders? That is the terrifying reality Ukrainian cancer specialists are currently experiencing. Russia's decision to initiate a full-scale invasion of Ukraine has led to a national crisis.

Tens of thousands of civilians—many of them children—have been killed due to the invasion that began on February 22, 2022, initiating unparalleled destruction and mayhem for everyone in its path. As of July 8, a quarter of Ukraine's population—5.5 million refugees in Europe and 6.3 million internally—have been displaced.

In breach of Article IV of the Geneva Convention, Russian forces are demolishing Ukrainian cities, firing missiles at civilian facilities, and purposefully damaging and destroying hospitals and clinics. Viktor Liashko, Ukraine's Minister of Health, claims more than 600 medical institutions were damaged within the first 100 days of hostilities, 105 of which were irreparably damaged.

Help Ukraine Group (HUG) was founded by a group of oncology professionals from the United States and Australia to collaborate with Ukrainian cancer specialists and create a feedback loop for identifying and meeting needs. Almost all Ukrainian cancer centers require disposable equipment and chemotherapeutic drugs.

Ukrainian physicians, such as Dr. Andriy Beznosenko, president of the Ukrainian Society of Medical Oncology, have prepared a list of pharmacological requirements of Ukraine's cancer treatment facilities. HUG members sent the list to international medical organizations and associations with the request that they organize "Support Ukraine" fundraisers on behalf of their membership and sector to aid Ukraine during the war.

Currently, only two of three PET/CT scanners in Ukraine, a country with a population of 44 million, are still operational. These scanners are in Kyiv, patients from across Ukraine must take a risky trip for diagnostic or follow-up PET/CT scans. To help address this situation Dr. Beznosenko and Dr. Oleh Duda, deputy chief of surgery at the Lviv Regional Cancer Center, are currently seeking the donation of a PET/CT and cyclotron to the Lviv cancer center to lower oncologic morbidity and mortality brought on by the war.

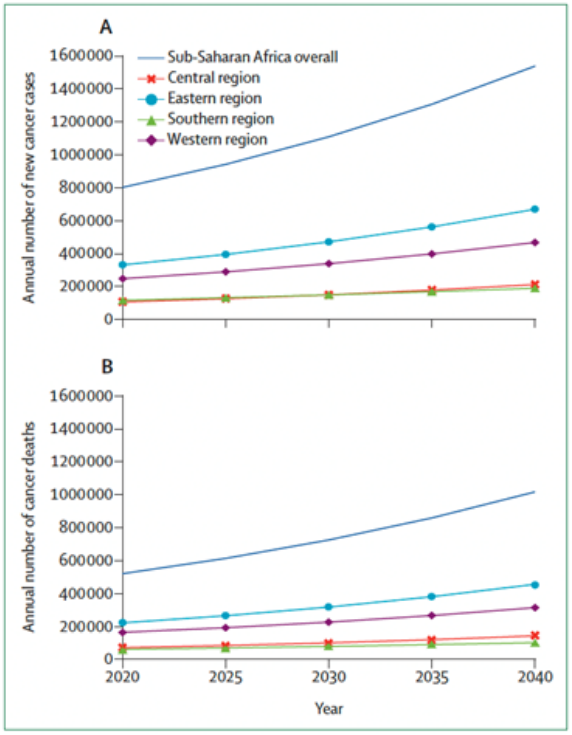
With the aid of American doctors who are voluntarily offering their services, a group of Stanford medical and computer science students under the direction of Solomiia Savchuk have established the TeleHelp Ukraine initiative to offer remote consultations and mental health support for Ukrainians in Ukraine and Poland.

Unfortunately, even if the war were to end today, the Russian invasion has seriously harmed the Ukrainian cancer care system, and it will take years to recover.

Editor's note: sourced from publications written by ***Nataliya Kovalchuck, PhD,*** *et al. collated by MPWB communications volunteer* ***Navid Khaledi****. For more information see: The Cancer Letter (August 2022), Applied Radiation Oncology Editorial (November 2022)*

Lancet Oncology Commission, Report on sub-Saharan Africa

The Lancet Oncology Commission presented a new report outlining the status of cancer rates and treatments in sub-Saharan Africa (SSA) at a recent symposium in Tanzania. Cancer rates in sub-Saharan Africa have doubled in the past 30 years. If action is not taken, 1.1 million people in Africa could die annually from cancers by 2030.



From the report, projected cancer incidence and mortality over time (2020-40) by sub-Saharan Africa sub-region

Key findings from the report include:

Need to establish robust centers. The report estimates an additional 5000 MV linear accelerators will be needed in SSA by 2040. Furthermore, brachytherapy remains unavailable to most countries in sub-Saharan Africa. A key element for effective treatment of cervical cancer.

Training and retention of oncology workers influences outcomes. The IAEA recommendation of 1 oncologist per 250-300 patients is far out of reach for sub-Saharan African facilities in their infancy.

Access to screenings and diagnostic tests remains a critical gap. There were more than 26,000 deaths from cancer in Tanzania this year alone. About 30–50% of all cancers can be prevented with population screening, early diagnosis, and treatment.

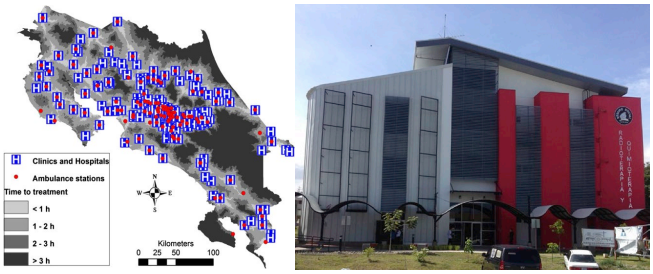
The World Health Organization applauded the Lancet Commission's effort. The symposium's guest of honor – Tanzania's Minster of Health, Ummy Mwalimu – addressed the situation as unacceptable and encouraged implementation of recommendations from the report. Tanzania has taken the lead in rapidly expanding its oncology workforce by instituting training programs to address personnel shortages.

The report emphasized improvements in cancer outcomes can only come from well-coordinated, locally implemented acts. It concluded with a call to action, urging policy makers, politicians, professionals, professional societies, non-governmental organizations, and citizens to unify in response to the increasing cancer burden in Africa.

*Editor's note: sourced from The Lancet publication by **Wilfred Ngwa, PhD**, et al. and press reports collated by MPWB communications volunteer **Patrick Sansone**. To access the report, see: The Lancet (June 2022)*

Continued, Costa Rica…

In addition to CCSS hospitals, there are a wide variety of private hospitals and clinics, and several providers of private insurance. In the past decade, Costa Rica has become a sought-after destination for medical tourism, where travelers combine visiting National Parks and other attractions with medical treatments, due to the availability of well-trained personnel with inexpensive rates. This has contributed to increased offerings of private services, including cancer facilities.



Left, Costa Rica showing its large number of clinics, hospitals, and ambulance stations, Right, cancer center at Hospital Mexico in San Jose, Costa Rica.

Currently, CCSS has the majority of linacs in the country, with 6 linacs at CCSS hospitals. These are used in rotation, 6 days a week, with three shifts to cover 24 hours each day (rotation schedule includes downtime). This heavy schedule has been implemented to address the needs of the population and reduce waiting times for initiation of treatment.

Regarding Medical Physics training, Costa Rica has two Master's in Medical Physics Programs, at the National University of Costa Rica in Heredia (UNA) and the UCR in San José. These academic programs were born out of necessity after the San Juan de Dios radiotherapy accident in 1996. In this accident 115 patients were over-exposed while receiving Cobalt-60 treatments.

Left, San Juan de Dios Hospital in San Jose, Costa Rica, location of the 1996 radiotherapy accident. Right, IAEA assessment

In the years following the accident, several graduates went on scholarship programs to study in Medical Physics programs in Brazil, England, France, Spain, Scotland, and the United States. Most of these medical physicists work in radiotherapy services at La Caja hospitals. Local training programs have been initiated thanks to efforts of these graduates and academics at UNA and UCR.

A recent advancement in available technology has been a cyclotron and PET/CT recently acquired by UCR. One of two existing cyclotron facilities in Central America (other in Panama) it will become the second PET/CT available in the country and the only one owned by a public institution. This acquisition is due to decades of effort by a team of UCR faculty and personnel, in securing funding and facilities needed. It is expected to start offering services to the public in 2023.

Costa Rica has come a long way since 1996; however, much work remains to be done. Funding limitations currently limit needed openings for medical physicists. Particularly relevant in areas such as diagnostic radiology and nuclear medicine. These limitations, including the bureaucratic details of public service laws, also impact the number of full-time faculty at academic institutions. For example, at UCR, which is the largest program, there are only two full-time professors with a doctorate in Medical Physics. Attending to administrative duties, teaching undergraduate courses, developing research programs, international collaborations, amongst others. The situation at UNA is not dissimilar.

In addition, although at UCR there is a system of scholarships for students in financial need, most of the Medical Physics graduate students must work elsewhere to cover their living expenses. As a result, many students take longer to graduate than the expected two years and some are not able to finish their thesis work due to their competing responsibilities.

Some difficulties are also due to the long commutes in the metropolitan area, which include cities of San José, Heredia, Alajuela, and Cartago. Although geographical distances may be short, traffic congestion is a serious problem in this region of the country, due to a combination of different urban planning, economic and cultural aspects.

All graduate program classes are held in the evenings, to accommodate working students. In addition, changes to virtual classes due to the COVID-19 pandemic has been deemed to be an important way to facilitate the permanence in the program for most students and has allowed the program at UCR to expand its offerings to students from abroad, particularly from the Central American region. Laboratories and clinical practices are the exception as those must be done in-person during the second year.

Since 2017, UCR has offered a virtual exchange program to undergrad and graduate students, regardless of institution, thanks to collaboration with Medical Physics colleagues in institutions across the Americas and Europe through the International Academic Virtual Exchange Network (IAVE). The purpose of IAVE is to provide students with opportunities to interact with medical physicists and practice their communication skills in English (and Spanish) while learning about different Medical Physics topics. All IAVE activities are free and powered by volunteers. For more information, please visit: https://iavenetwork.webnode.com

Despite the limitations mentioned, the field of Medical Physics in Costa Rica is at a much better place than it was in the decades prior, and the efforts of many people, through many years, are slowly bearing fruit.

Editor's note: Please reach out to Dr. Porras-Chaverri with collaboration opportunities or to inquire about the training programs at UCR: Mariela.Porras@ucr.ac.cr