

Radiological physics within the framework of PAHO technical cooperation programs

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Medicine was revolutionized at the end of the 19th century thanks to a number of discoveries in the field of physics. In 1895, Roentgen discovered X-rays, which made it possible to visualize internal structures in the human body. The following year Becquerel discovered radioactivity, and in 1898 the Curies (husband and wife) announced the discovery of two radioactive elements: polonium and radium. The latter was immediately put to use to obliterate skin cancers and deep-seated tumors or reduce their size (1). However, these new technologies were not without dangers: the first report of adverse effects of X-rays on human health, after overexposure in a patient who underwent radiography in Chicago, Illinois, United States of America, was published in 1896 (2). Since their inception, image-based diagnostic techniques, radiotherapy (also known as radiation therapy), and radiation protection have evolved in parallel.

Regrettably, advances in physics in the field of radiation during World War II also led to the invention of nuclear weapons, which in turn gave rise to an era of competition between world powers to develop and produce arms of this type. During the 1950s, the United States—aware of the potential applications of these new technologies to agriculture, industry, and medicine, and in an effort to further the use of nuclear energy for peaceful ends—promoted the Atoms for Peace initiative, which fomented the development of nuclear and radiological techniques throughout the world. This initiative also involved developing countries, many of them in Latin America and the Caribbean.

It was also during the 1950s when a new discipline, known as medical physics, made its appearance in certain European countries such as Sweden and the United Kingdom. Medical physicists are science professionals who, just as Roentgen, Becquerel, and the Curies did in their day, apply their knowledge of physics to medicine, particularly in the area of diagnostic and therapeutic radiology. As of 2006, medical physicists number more than 16 000 throughout the world (3), and this number continues to rise with continuing technological advances.

In the 1970s, the invention of the first computed tomography scanner changed the world of radiological physics once again (1). Currently, most of the equipment used in this field is computerized, and imaging techniques are now being applied at the cellular level, with the result that molecules that play a critical role in the development of certain diseases can be identified long before the clinical symptoms appear.

The beneficial effects of these technological advances for public health are substantial. Thanks to these innovations we are able to diagnose a number of diseases, such as cardiovascular

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disorders and neoplasms, in the early stages, and to cure them more easily. In many cases, radiotherapeutic techniques have made it possible to control cancer with less morbidity and more satisfactory cosmetic results than surgery.

Owing to the importance of these techniques—not only in clinical specialties but also in public health—the Pan American Health Organization has been advising governments and training health professionals in countries in Latin America and the Caribbean through its radiology and radiation protection program. In an article in this special issue the three most recent regional advisors to the program (4) describe this collaborative process and offer a historical perspective on the results of the PAHO radiological health program, since its inception in the 1960s.

The work remaining to be done is enormous, and strategic alliances are of key importance. We maintain close contact with the Collaborating Centers of the Pan American Health Organization/World Health Organization that are in countries of the Americas (5), and have the support of professional societies of radiologists (*Colegio Interamericano de Radiología, CIR*) (6), radiation oncologists (*Asociación Latinoamericana de Terapia Radiante Oncológica, ALATRO*) (7), medical physicists (*Asociación Latinoamericana de Física Médica, ALFIM*) (8) and radiological technologists (*Asociación Latinoamericana de Técnicos de Radiología, ALATRA*) (9). In addition, together with other intergovernmental organizations, we belong to two international committees, one devoted to radiation safety (*Inter-Agency Committee on Radiation Safety, IACRS*) (10) and one concerned with radiological and nuclear emergencies (*Inter-Agency Committee on Response to Nuclear Accidents, IACRNA*) (11). At this time we are in the process of reviewing the *International basic safety standards for protection against ionizing radiation and for the safety of radiation sources* (12), whose previous version was endorsed by our Governing Bodies (13) and whose new edition we hope will complement—rather than simply replace—the established standards.

Revista Panamericana de Salud Pública/Pan American Journal of Public Health (RPSP/PAJPH) has put together this collection of articles and reports on diagnostic radiology, radiotherapy, and radiation protection written by professionals from different backgrounds, including radiologists, radiobiologists, medical physicists, and specialists in radiation protection. This special issue of the RPSP/PAJPH aims to raise awareness on the part of health officials and public health professionals regarding the needs and challenges we face in applying these technologies. We hope that reading this issue will motivate our professional colleagues and health ministry workers in the Americas to broaden the traditional scope of public health to include these disciplines, and will help accelerate changes that are so urgently needed and that will go a long way toward improving the health of the peoples of the Americas.

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