

## Human Health



# Detecting and Treating Cervical Cancer Using Diagnostic Imaging Techniques and Radiotherapy

## IAEA Support to Latin America and the Caribbean

### SUMMARY

1. The diagnosis and treatment of cervical cancer are an important area of cooperation in the field of human health between Member States in the Latin America and the Caribbean region and the IAEA.
2. Nuclear medicine and radiation therapy offer rapid diagnosis and effective treatment for various types of cancer. Cervical cancer is usually curable if caught early and treated.
3. Member States in the region have shown a very strong commitment to enhancing access to radiation oncology and to assuring the quality of treatment. Many are focusing on education and training and the modernization of clinical infrastructure in national institutions responsible for health care and services.

### INTRODUCTION

Cervical cancer is the second most common cancer among women worldwide. Some 83% of cervical cancer cases occur in developing countries. In the countries of Latin America and the Caribbean, cervical cancer incidence and mortality rates are among the highest in the world. It is the leading cause of death in women between 20 and 40 years of age, and the third most common cause of cancer mortality in women in this region.<sup>1</sup>

<sup>1</sup> See Pan American Health Organization website: [www.paho.org/cancer](http://www.paho.org/cancer)



A brachytherapy machine that is used to treat various types of cancers, including cervical cancer. (Photo:IAEA)

In 2012, more than 83 000 women in the Americas were diagnosed with cervical cancer and almost 36 000 women died from this disease. If current trends continue, the number of deaths from this cancer is projected to increase by 45% by 2030.<sup>2</sup> The mortality rates for cervical cancer are three times higher in Latin America and the Caribbean than in North America, which serves to highlight the enormous existing health inequalities.<sup>3</sup>

Poorer women, often less educated, are frequently unaware of the options that are available for cervical cancer screening, or have no access to these services. Despite the efforts to reorganize screening programmes in some countries in the region, only a slight decrease in cervical cancer mortality has been observed by the Pan American Health Organization.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

The Latin America and the Caribbean region is faced with a critical lack of screening technology and radiotherapy equipment, a shortage of radiation oncologists and medical physicists, and also with an inadequate primary care infrastructure to ensure effective referral for treatment. This gap in equipment and expertise requires immediate attention if the growing number of cervical cancer cases is to be addressed effectively. Training and mentoring networks, together with innovative public-private partnerships, also play an important role in strengthening this field of health care.

### **DIAGNOSIS OF CERVICAL CANCER USING NUCLEAR TECHNIQUES**

The earlier cancer is diagnosed, the more effective treatment will be. Radiation technology and related technologies, such as diagnostic imaging techniques, play a key role in cancer diagnosis, treatment and palliation.

The nuclear techniques single photon emission computed tomography (SPECT), computed tomography (CT), and positron emission tomography (PET) play a critical role in mapping out the human body and identifying cancers early on. They are used to see inside the human body and can focus on target areas from multiple angles. Using these techniques, cervical cancer can also be swiftly identified.

### **TREATMENT OF CERVICAL CANCER USING NUCLEAR TECHNIQUES**

Over 70% of women with cervical cancer need radiation therapy for cure or palliation. External beam radiation therapy (also known as 'teletherapy') and brachytherapy (see box) offer safe and effective treatment options for cervical cancer. Radiotherapy improves control of the cancer locally in the pelvis and leads to greater survival rates.

### **IAEA SUPPORTS GLOBAL EFFORTS TO PREVENT CERVICAL CANCER**

The IAEA is participating in a five-year United Nations Joint Global Programme on Cervical Cancer Prevention and Control as a response to the global cervical cancer health crisis. The Joint Programme's goal is to reduce cervical cancer mortality by 25% by 2025.

The IAEA will leverage its unique mandate and its role in supporting the development of capacities in its Member States in the area of radiation medicine (encompassing nuclear medicine, diagnostic radiology and radiotherapy) for this joint global initiative, which was presented at the 60th regular session of the IAEA General Conference in September 2016.

### **IAEA SUPPORT FOR CAPACITY BUILDING IN MEMBER STATES**

Human health is a high priority for all IAEA Member States, with over 25% of the IAEA's technical cooperation (TC) projects focusing on this field. Cancer-related projects account for a significant proportion of these.

The TC programme has provided assistance to Member States in many different fields related to cancer for over 50 years, particularly in the areas of radiotherapy, quality assurance, and radiation protection of workers, patients and the public. It also delivers support through training, expert assistance, fellowships and the procurement of equipment and materials to help Member States in the area of cervical cancer diagnosis and treatment.

With the technical support of the IAEA Division of Human Health, the TC programme assists in improving various clinical procedures to provide complete, efficient and evidence-based therapeutic responses for cancer treatment, including cancers of the cervix.

The IAEA Division of Human Health has produced extensive guidance documents on setting up radiotherapy services, including brachytherapy and radiology, as well as training material and guidelines

for the clinical management of cervical cancer, which cover the implementation of advanced brachytherapy techniques.

To ensure that radiotherapy facilities already in place are providing the best treatment and care possible, the IAEA offers comprehensive audits of radiotherapy practices, including postal dosimetry audits<sup>4</sup> and the calibration of dosimetry equipment through the IAEA's Dosimetry Laboratory, as well as developing guidelines and procedures to be followed. The Dosimetry Laboratory provides dose audits to over 2000 radiation therapy centres in countries that have no other means of verifying the quality of their clinical dosimetry. It also serves as the coordinating laboratory of the IAEA/WHO Network of Secondary Standards Dosimetry Laboratories, which provides quality assurance services and develops and disseminates dosimetry methods. The IAEA's support helps Member States to verify the implementation of internationally recognized dosimetry codes of practice in order to assure proper dissemination of dosimetry standards to the end users, such as radiotherapy hospitals and radiation protection institutions. These audits help to give Member States the confidence that their facilities are providing the best treatment possible.

Additionally, the IAEA Programme of Action for Cancer Therapy (PACT) works in partnership with the World Health Organization to support IAEA Member States in expanding access to health technologies, building skills and mobilizing resources to develop a complete range of quality, effective and sustainable cancer services.

Recent achievements under IAEA TC projects in the region include:

- The establishment of El Salvador's only brachytherapy centre so far within the Dr Narciso Díaz Bazán Cancer Institute;

<sup>4</sup>A remote dosimetry procedure in which the thermoluminescent dosimeters are sent and received back by mail.

- Procurement of a new brachytherapy machine at the Radiology Institute and Cancer Control Centre in Uruguay's Pereira Rossell Hospital;
- Supporting capacity building in Bolivia related to the country's cancer treatment programme to reduce morbidity and mortality;
- Establishing a high dose rate brachytherapy programme in Guatemala so as to increase access to, and quality of, brachytherapy for patients with gynaecological tumours;
- Establishing a high dose rate brachytherapy unit and a nuclear medicine department in Honduras so as to improve cancer control and quality of treatment, as well as strengthening human resources in radiation medicine;
- Improving the quality of radiotherapy for patients and strengthening radiotherapy services at the National Radiotherapy Centre in Nicaragua; and
- Strengthening nuclear medicine for diagnosis and therapy to improve the quality of diagnostic services and radiopharmaceutical products for patients in Paraguay.

## RECOMMENDATIONS FOR CONSIDERATION

1. Increasing access to diagnosis and treatment: Member States are encouraged to make full use of the IAEA's assistance to help countries to develop capacities and facilities that improve access to services for the diagnosis and treatment of cervical cancer. This includes capacity building in nuclear medicine and radiotherapy, together with the provision of necessary equipment. Through its Programme of Action for Cancer Therapy, the IAEA also helps countries to develop comprehensive cancer control programmes.
2. Safety comes first: Member States are encouraged to promote and ensure the development of the highest global safety standards in the use of radiation techniques and technologies.

3. Quality assurance for calibration and monitoring of imaging equipment: Member States are encouraged to ensure that comprehensive quality audits in nuclear medicine, diagnostic radiology and radiation oncology are conducted through a combination of tools and guidance for self-auditing, as well as by carrying out external audits when requested.
4. Right dose: Member States are encouraged to develop and maintain internationally recognized

dosimetry standards in the application of nuclear techniques for the detection, diagnosis and treatment of diseases such as cancer. The IAEA's Dosimetry Laboratory at Seibersdorf audits, upon request by Member States, the accuracy of countries' radiation equipment and dose measurements. This Laboratory also verifies beam calibrations used for the treatment of cancer patients worldwide.






## RADIOTHERAPY

- Teletherapy refers to radiation therapy given by an external radiation source at a distance from the body. It is the most common type of radiotherapy used in cancer treatment and is usually given by a cobalt unit, which delivers high-energy gamma rays, or a linear accelerator, which can deliver high-energy X-rays or electrons. In the most common scheme, treatment is given daily for a period of 4–8 weeks.
- In brachytherapy sealed radioactive sources are placed in or near the tumour itself, giving a high radiation dose to the tumour while reducing the radiation exposure in the surrounding healthy tissues.

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