



# The Linear Accelerator Facility

## Enhancing Radiotherapy Services for Member States

A new linear accelerator (linac) facility is being established for the IAEA's Dosimetry Laboratory, one of eight Nuclear Applications (NA) laboratories in Seibersdorf, Austria. This is part of the ongoing initiatives to modernize the NA laboratories, known as the RenuAL/ ReNuAL+ projects. The Dosimetry Laboratory (DOL) supports quality radiation dosimetry through the provision of services, including dosimetry calibration and dose auditing.

For many years, cobalt-60 machines were predominantly used to administer external beam radiotherapy. Over the last few decades health care providers have been switching to linacs, which offer greater versatility in dose delivery. Furthermore, as electronic generators of radiation, as opposed to the radioactive source-based cobalt-60 units, linacs do not require the complexities that accompany the management of radioactive sources.

## Modernizing the Dosimetry Laboratory with a New Linear Accelerator Facility

In 2017, linac beams accounted for over 80% of the DOL's audits, which indicates the extent of Member States' needs for assistance in the safe and effective use of linac technology. However, without a linac, conversion coefficients need to be applied to calibrate dosimeters when using only the cobalt-60 machine.

With the new linac facility, the DOL will be able to increase and enhance its support for the use of linacs and better meet the demands of Member States. This will include direct calibration of Secondary Standards Dosimetry Laboratories (SSDLs) instruments in linac beams and enhanced audit services for the more than 3200 medical linacs in low- and middle-income countries. The new facility will enable new training opportunities in Seibersdorf on linac dosimetry as well as additional areas of research to identify and establish best practices and applications in the use of linacs for radiotherapy.

Preparatory work for construction began in 2017 and the facility is expected to be operational by the end of the third quarter 2018.

# By the Numbers

OVER  
**1800** HOSPITALS  
IN  
**101** MEMBER STATES

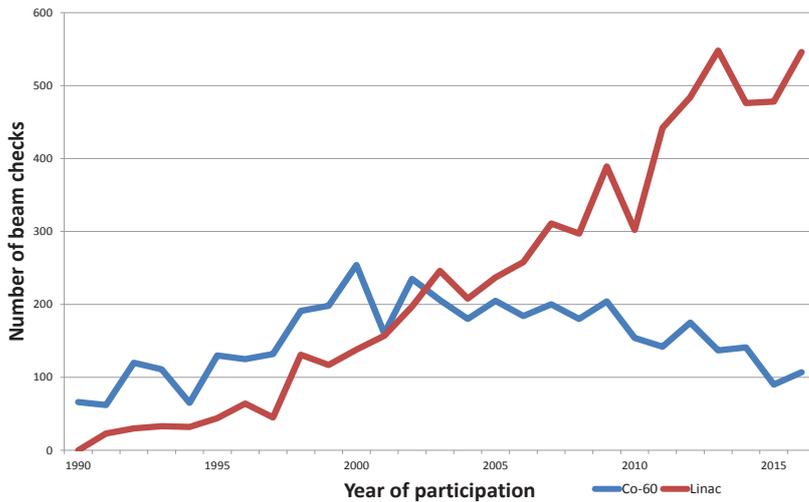
HAVE BENEFITED FROM DOSIMETRY AUDITS IN RADIOTHERAPY THROUGH THE IAEA/WHO AUDIT SERVICE SINCE 2012.



**71** MEMBER STATES  
BENEFIT FROM THE IAEA/WHO SECONDARY STANDARD DOSIMETRY LAB NETWORK



Number of beam checks performed for linac and Co-60 radiotherapy machines at the Dosimetry Laboratory



## The Dosimetry Laboratory

The DOL's services include dosimetry calibration and auditing services. Calibration services are provided to SSDLs, which themselves provide such services to radiotherapy hospitals in their respective countries. The DOL serves as the central laboratory of a global SSDL network jointly managed by the IAEA and the World Health Organization (WHO).

The DOL offers dose audits to ensure that radiotherapy equipment is properly calibrated for accurate, reliable and

effective cancer treatment. Differences as small as 5% from the intended radiation dose can change the outcome of radiation therapy. By aiming for high accuracy of doses given to patients, dosimetry audits help eliminate risks related to inadequate dosimetry practices at hospitals. These audits have been operated through the IAEA/WHO dosimetry audit service since 1969. In addition, the DOL provides training and conducts research and development in dosimetry and medical radiation physics.

## Radiotherapy and the Global Cancer Epidemic



In recent years, the global incidence of cancer has risen to epidemic proportions. According to the WHO, nearly one in six deaths is now due to cancer, which makes it the second leading cause of death worldwide. The availability and quality of cancer control services, therefore, is a key component of public health and efforts to achieve Sustainable Development Goal #3: Good Health and Well-Being.

Close to 50% of cancer patients require radiation treatment. Too much radiation will damage healthy tissue, while too little will not effectively eliminate cancer cells. Quality assurance in dosimetry is essential in this respect and helps to ensure accurate radiation doses.

## A New Partnership in the Fight Against Cancer



In September 2017, the IAEA reached an agreement with Varian Medical Systems, Inc. to provide the DOL with a linac. Under this agreement, Varian will make the linac available for a period of ten years. The Department of Energy of the United States of America is funding maintenance and servicing for the first five years as an in-kind contribution. This partnership will play a key role in increasing and enhancing support for the use of linacs in Member States and will benefit cancer patients around the world.