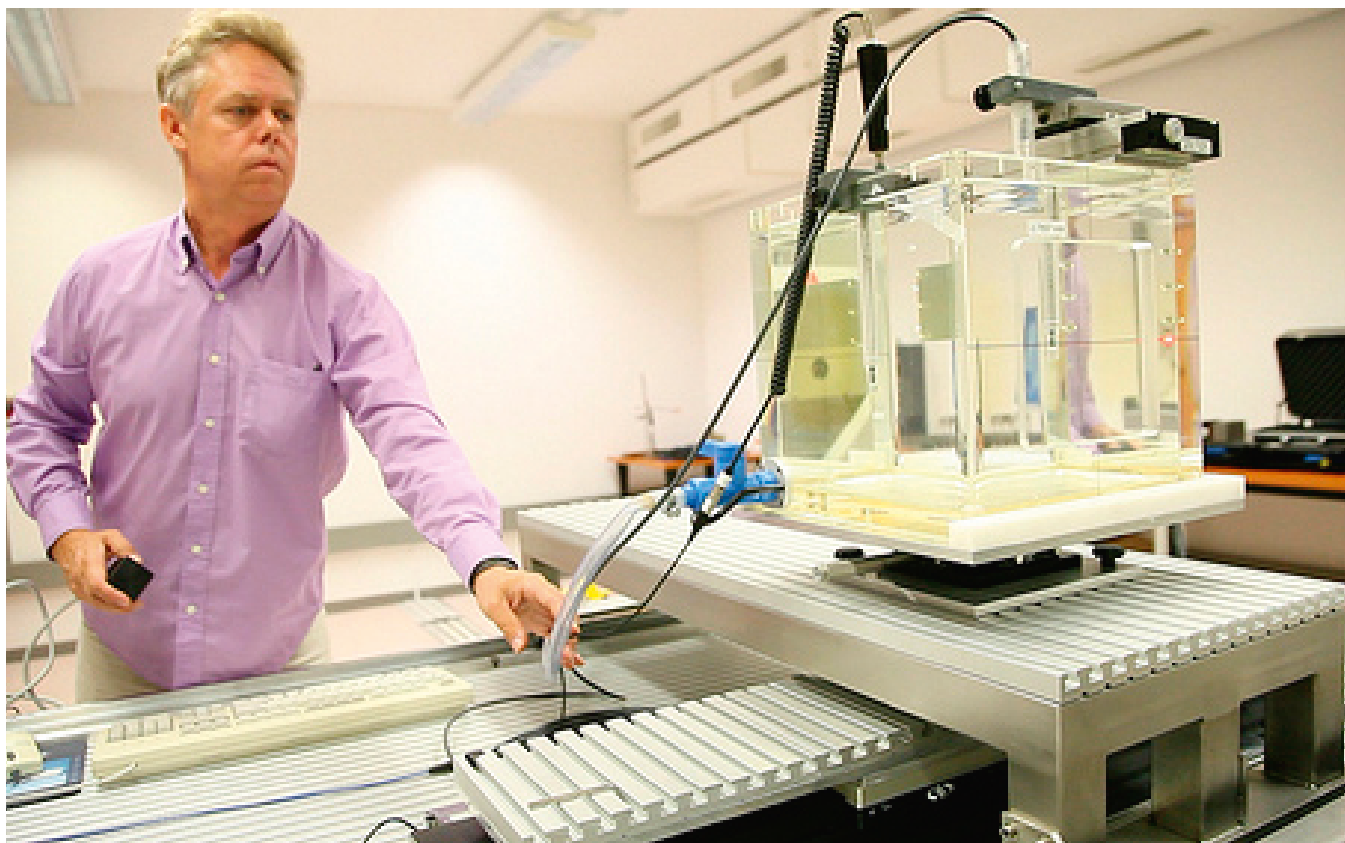


FIGHTING THE GLOBAL CANCER EPIDEMIC THROUGH PRECISE MEASUREMENTS



Setting up equipment for dosimetry calibration at the IAEA Dosimetry Laboratory
(Photo: Rodolfo Quevenco, IAEA)

Cancer has passed heart disease to become the single leading cause of death worldwide. In 2000, there were 10.1 million new cases of cancer and 6.2 million deaths caused by cancer. By 2012, these numbers had risen respectively to 14.1 million and 8.2 million. As the global cancer epidemic continues to spread, the need for effective diagnosis and treatment is growing. Nuclear and other related technologies, such as diagnostic imaging techniques and radiotherapy, are fundamental to diagnosing and treating cancer. Both diagnostic imaging and radiotherapy involve radiation exposure, which can be highly effective for treating patients, but also dangerous to medical staff and patients if not used accurately and safely. Techniques such as medical dosimetry help to ensure the safe use of radiation.

Medical dosimetry is a cornerstone of safe and effective cancer diagnosis and treatment. It deals with the measurement of absorbed doses and the optimization of dose delivery in radiation medicine. This includes activities such as audits and the calibration of equipment, the development and dissemination of dosimetry

techniques, and the implementation of quality assurance programmes.

The IAEA's Dosimetry Laboratory (DOL) helps Member States around the world to improve the safety and quality of radiation medicine. This in turn helps to maximize the effectiveness of diagnosis and treatment to improve a patient's health. For example, the DOL conducts audits in response to Member States' requests. It provides dose audits to over 2000 radiation therapy centres in countries that have no other means of verifying the quality of their clinical dosimetry. An integral part of the auditing process is resolving discrepancies that are discovered.

Many Member States have no means of verifying the quality of their calibration and measurement capabilities other than through the IAEA. Thus the DOL also serves as the coordinating laboratory of the IAEA/WHO Network of Secondary Standards Dosimetry Laboratories (SSDL Network). The global SSDL Network comprises 86 laboratories in 67 Member States that provide quality assurance services, and develop and disseminate



dosimetry methods. The DOL has been coordinating SSDL activities in close partnership with the World Health Organization (WHO) since 1976. SSDL services and activities help to ensure quality and safe practices, which ultimately benefit patients who are undergoing diagnostic tests or radiotherapy as well as medical staff who operate radiation equipment.

To maintain the DOL calibration and auditing services at the appropriate level and to enable dosimetry standards to be disseminated properly by the SSDL Network, the DOL carries out research and development on radiation dosimetry techniques and collaborates with international organizations focused on dosimetry and medical physics. The DOL contributes to the organizations' work and benefits from early access to projects. The SSDLs, as well as the radiotherapy centres and the communities that they serve, benefit from this collaboration and the research and development.

It is also imperative that the DOL remain cognizant of changes in medical technology that can lead to changing needs in dosimetry. For example, radiotherapy for many years depended on the use of cobalt-60 or caesium-137 as sources of radiation. But as nuclear security concerns have increased, it has

become increasingly difficult to procure these sources. Consequently, many countries are shifting towards linear accelerators that can generate radiation without a radioactive source. This in turn requires the DOL to develop and disseminate methods and techniques and provide quality assurance support to ensure that Member States can adapt to this important technological trend.

The many activities and services of the DOL are valuable contributions to the worldwide fight against cancer and help cancer patients around the globe live longer, healthier lives.

IAEA Department of Nuclear Sciences and Applications

The dosimetry auditing activities of the IAEA Dosimetry Laboratory help to ensure that cancer patients receive safe and effective treatments with radiation beams generated by radiotherapy machines such as this one.

(Photo: Dean Calma, IAEA)