

Establishing nuclear health services to improve the diagnosis of cancer in Azerbaijan

The challenge

Azerbaijan, a country with a population of 9 million, registers around 8000 new cancer cases annually. Enhancing the public health care system by using modern nuclear methods to improve cancer treatment and early diagnosis is a national priority. Azerbaijan's Country Programme Framework for 2015–2020 also highlights comprehensive cancer control as a key concern.

The country's main public oncology centre, the National Centre of Oncology, has X-ray computed tomography (CT) and magnetic resonance tomography (MRT) methods at its disposal, and treats most of the cancer patients in the country. Although CT and MRT methods are used as 'first resort' modalities for cancer and metastasis diagnoses, new techniques like positron emission tomography-computed tomography (PET-CT) had not yet been implemented in 2012. These new techniques offer significant advantages, including providing early diagnosis for some types of cancer.

The Government of Azerbaijan therefore decided to set up a nuclear medicine centre with cyclotron and PET-CT facilities, in order to improve diagnostic imaging and strengthen the detection of non-communicable diseases in the country.

The project

IAEA technical cooperation support was requested for the establishment of the cyclotron facility and a PET centre, in order to improve the infrastructure for cancer diagnostics in Azerbaijan. The country provided equipment — namely, a cyclotron, PET-CT scanner, hot cells, synthesisers, quality control installations—and a facility to house this in, while IAEA support focused mainly on the provision of expert advice and training.

IAEA technical officers and experts supported project implementation, and provided project monitoring and multidisciplinary expert advice. The IAEA also assisted the National Centre for Oncology of Azerbaijan in the timely review of documents,



Dazhu Yang, IAEA Deputy Director General and Head of the Department of Technical Cooperation, and Dr Jamil A. Aliyev, Director General of the National Centre of Oncology, opening the new nuclear medicine centre in Baku, Azerbaijan.

provided necessary help in obtaining regulatory permissions, and conducted the final audit of the completed facility. IAEA support included knowledge transfer: the technical staff of the centre received training to ensure the provision of services to cancer patients, and to support safety and the protection of patients, staff and the public from ionizing radiation.

The impact

With IAEA support, Azerbaijan has been able to establish, equip and staff a cyclotron and PET-CT facility, which is housed in the newly founded nuclear medicine centre in Baku under the auspices of the National Centre for Oncology. The combination of PET and CT, thanks to state-of-the-art multimodality scanners, provides both functional and anatomical information with great advantages over conventional equipment. The centre is now appropriately equipped to address the health needs of the population, and in particular the needs of cancer patients. It supports early detection, staging and disease management, and thereby improves the life expectancy of patients. The staff trained under this project are expected to contribute significantly to the operation, management and further implementation of PET technology in the country. Continued training of staff, especially in the fields of radiopharmacy and nuclear medicine, is being supported under a follow-up project.



The new nuclear medicine centre in Baku, Azerbaijan.

PROJECT INFORMATION

Project No: AZB6008

Project title: Introducing Cyclotron and Positron Emission Tomography/Computed Tomography (PET/CT) in Clinical Practice

Duration: 2012–2015 (4 years)

Budget: €77 739

Contributing to:



Facts and figures

- A new nuclear medicine centre was established, opening in April 2016.
- In the first 6 months, over 300 PET-CT scans were performed, with an expected 2000 scans per year on patients suffering from cancer and cardiovascular diseases.
- The cyclotron facility is producing different radiopharmaceuticals for cancer and neuroendocrine tumour imaging, bone scans and prostate scans.

The science

PET-CT is a major diagnostic imaging technique, mainly used to determine the presence and severity of cancers, cancer recurrences, neurological conditions and cardiovascular diseases. This advanced nuclear imaging technique combines positron emission tomography (PET) and computed tomography (CT), thereby revealing information about both the structure and function of cells and tissues during a single imaging session. During a PET-CT scan, for example, the patient is first injected with a fluorodeoxyglucose solution that contains a very small amount of radioactive material (fluorine-18). The compound, also known as a radiopharmaceutical, is metabolized by cancer cells but not by normal cells. The PET-CT scanner is then able to detect and locate damaged or cancerous cells that are consuming the glucose, as well as the rate of glucose consumption, which helps to determine the tumour grade. The procedure is painless and varies in length, depending on the part of the body being evaluated.

The radioisotope fluorine-18 is produced in cyclotrons and has a half-life of 110 minutes. Therefore, it is necessary for cyclotrons to be located near major PET facilities.

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