

## **SOCIOECONOMIC IMPACT OF A MEDICAL CYCLOTRON IN KERALA, INDIA**

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Positron Emission Tomography (PET) has applications in oncology, cardiology, and neurology. As per the IAEA data (IMAGINE), the number of PET scanners available per million is more than three in higher income countries, however, in India it is presently less than one. Local availability of radiopharmaceuticals is the key factor in promoting the investment on PET-CT machines. In this study we analyse the role of proximity of a medical cyclotron in the growth of PET-CT centres in the state of Kerala, India.

The first PET-CT machine in Kerala was installed in 2008 which functioned using radiopharmaceuticals procured from Mumbai and then from Bangalore, both transported by flight. The installation of an 11 MeV Siemens HP cyclotron was initiated in Kochi, Kerala in 2015 and by the same time another four PET-CT machines were installed in Kerala anticipating local supply. The cyclotron was licensed for operation in 2017 and within four years the number of PET scanners in the state increased to 16 including a PET-MR (Fig.1). The location of the PET scanners in Kerala is given in Fig. 2.

As per a recent report, approximately 23,000 new cancer cases are registering every year in Kerala [1]. The total number of living cancer cases in the state could be over 150,000. These patients will need at least one PET-CT scanning per year as part of staging, therapy evaluation, restaging and recurrence evaluation. However, the present number is about 40,000 as deduced from the supply of radiopharmaceuticals. Hence, there exists a large gap even today with the current availability of PET-CT scanners in the state.

As per the records of Atomic Energy Regulatory Board (AERB) there are 297 PET-CT scanners in India (0.22 scanner per million population). Kerala is in the second position regarding the availability of PET-CT scanners (0.45 scanner per million population) and is far above the national average when union territories are excluded.

The radiopharmaceuticals from the Molecular cyclotron facility are transported to hospitals within 250 km by road which takes a maximum of 4 hours at a cost which is about 40-50% of what was prevailing when the medicine was brought from other states. Local and reliable availability of FDG had a big impact in the cost of PET-CT scan which almost halved. While ten years back most patients from the state were going to Bangalore or Mumbai for PET-CT scan, a hospital facility offering this service is available within 50 km from the residence for all patients resulting in enormous cost reduction in travel, stay and cost of PET-CT. The real impact was that the oncologists started relying more on PET-CT for patient management thereby percolating the benefits of PET-CT scan to more needy patients.

Establishment of the cyclotron in the state of Kerala brought significant growth in practice of nuclear medicine in Kerala. As per IMAGINE, Kerala requires at least 35 PET-CTs to reduce inequities in access to diagnostic nuclear medicine. This number is expected to be achieved within three years in Kerala and will grow further. A second cyclotron facility is under planning to cater to the enhanced demand of radiopharmaceuticals.

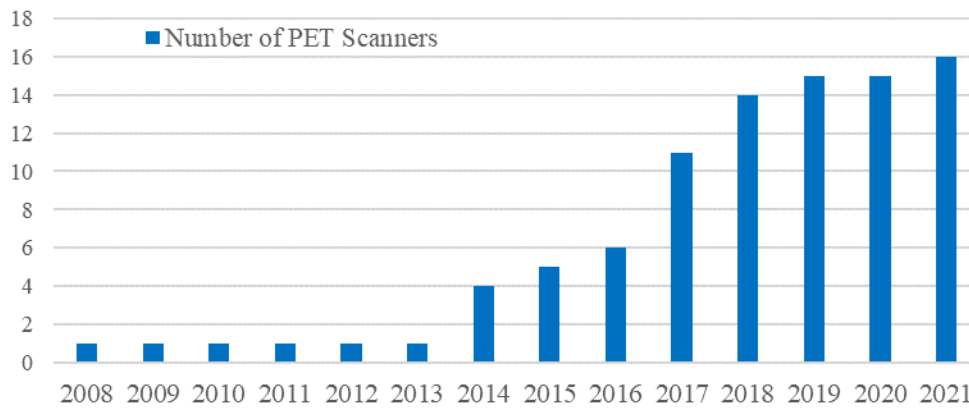


FIG. 1. Year-wise gradual increase in the number of PET scanners in the state of Kerala

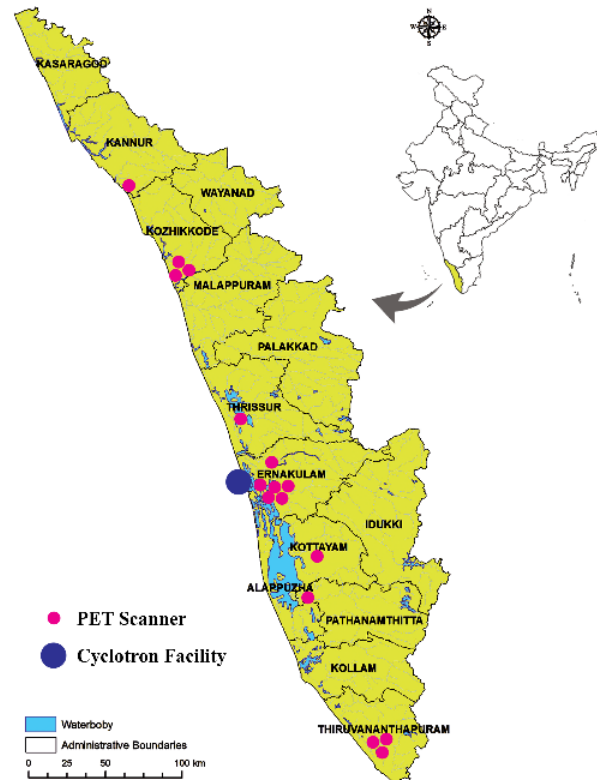


FIG. 2. Location of PET scanners and cyclotron facility in the state of Kerala

## REFERENCES

- [1] Clinicopathological Pathological Profile of Cancer in India: A Report of the Hospital Based Cancer Registries (2021).