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SOCIOECONOMIC IMPACT OF A MEDICAL CYCLOTRON IN KERALA, INDIA

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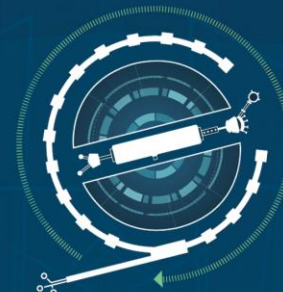
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**Accelerators for Research
and Sustainable Development:**

From Good Practices Towards Socioeconomic Impact



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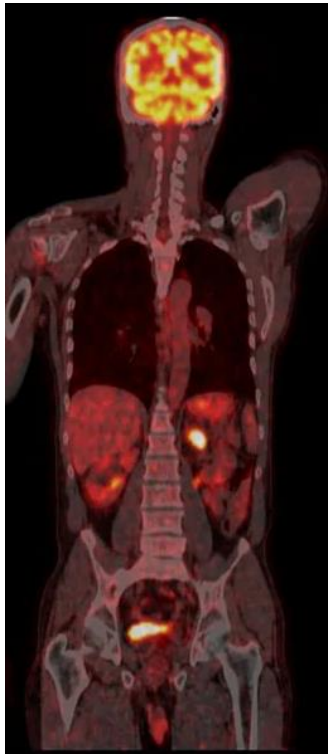
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International Atomic Energy Agency
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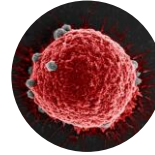
Applications of Nuclear Medicine Imaging



SPECT



PET



Detection of
cancer and its spread



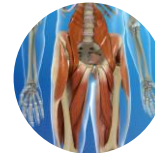
Detection and monitoring of
cardiovascular diseases



Identification of
neurologic and psychiatric diseases



Imaging of normal and abnormal functions of
excretory organs



Identification of regional tissue damage due to
infection or trauma



Identification and quantification of
endocrine disorders



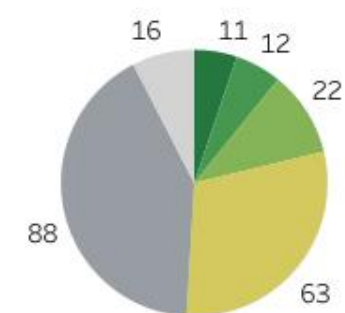


1200+
Cyclotrons

5600+
PET Scanners

PET Scanners (per million population)

Countries	Countries with PET scanners	Regions	Population (mil)	Number of PET scanners	PET scanners (per 1 mil)
212	109	6	7,674M	5,672	0.739



PET scanners ranges

- More than 3
- Between 2 and 3 (inc)
- Between 1 and 2 (inc)
- Between 0 and 1 (inc)
- No PET or PET/CT scann..
- Data not available



Cyclotrons & PET Scanners in India



21
Cyclotrons

333
PET Scanners

1.4 billion
Population

4.2

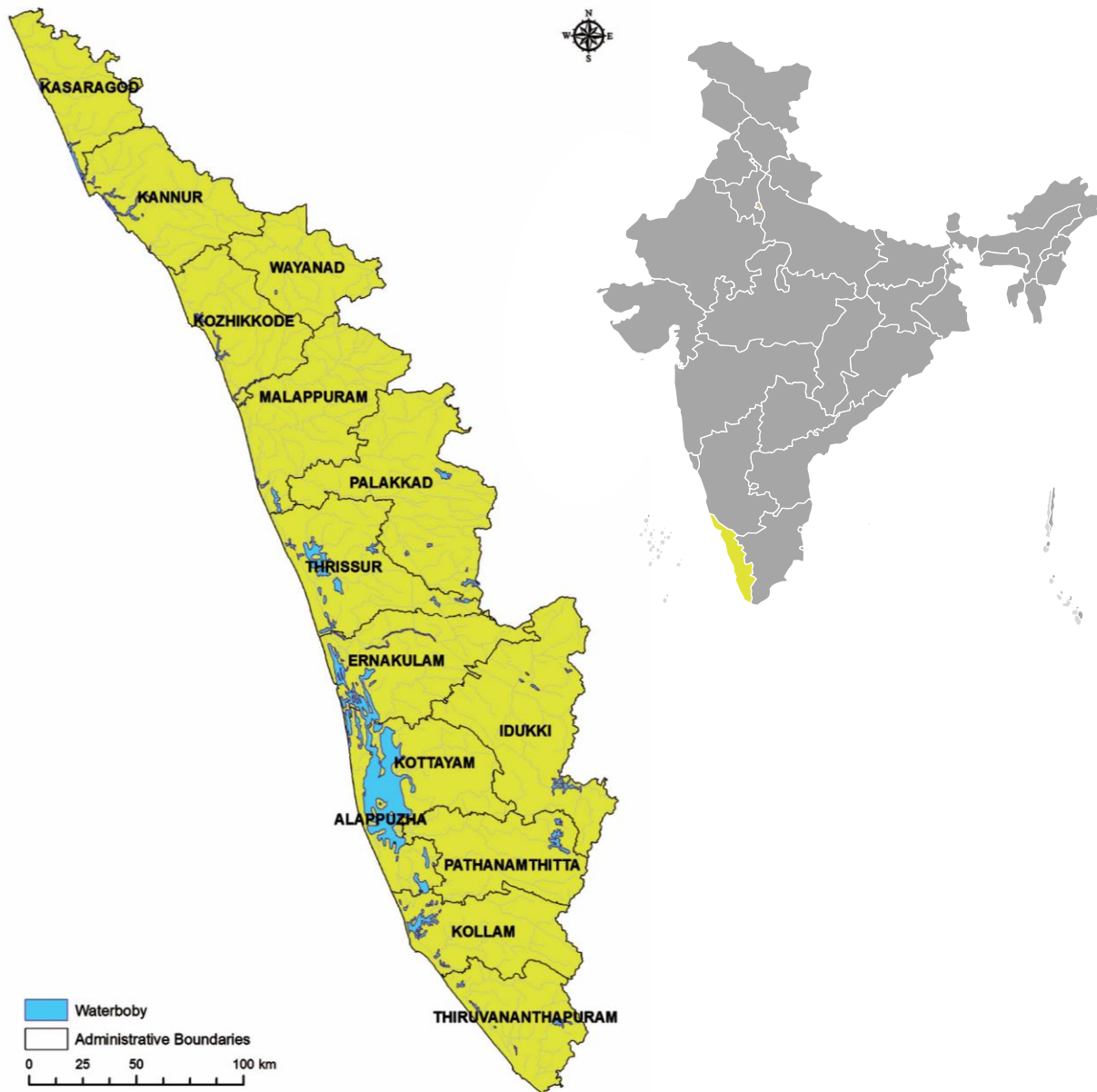
Millions are served
by 1 PET Scanner

or

0.24

PET Scanners
(per million)





Kerala

Southern State of India

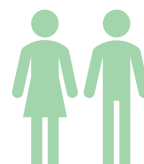


Area

38863 sq. km.

~ Netherlands

~ Switzerland



Population

35+ Million

2 × Netherlands

4 × Switzerland



Health

1st Rank in Health Index

State wise performance - 82.20/100

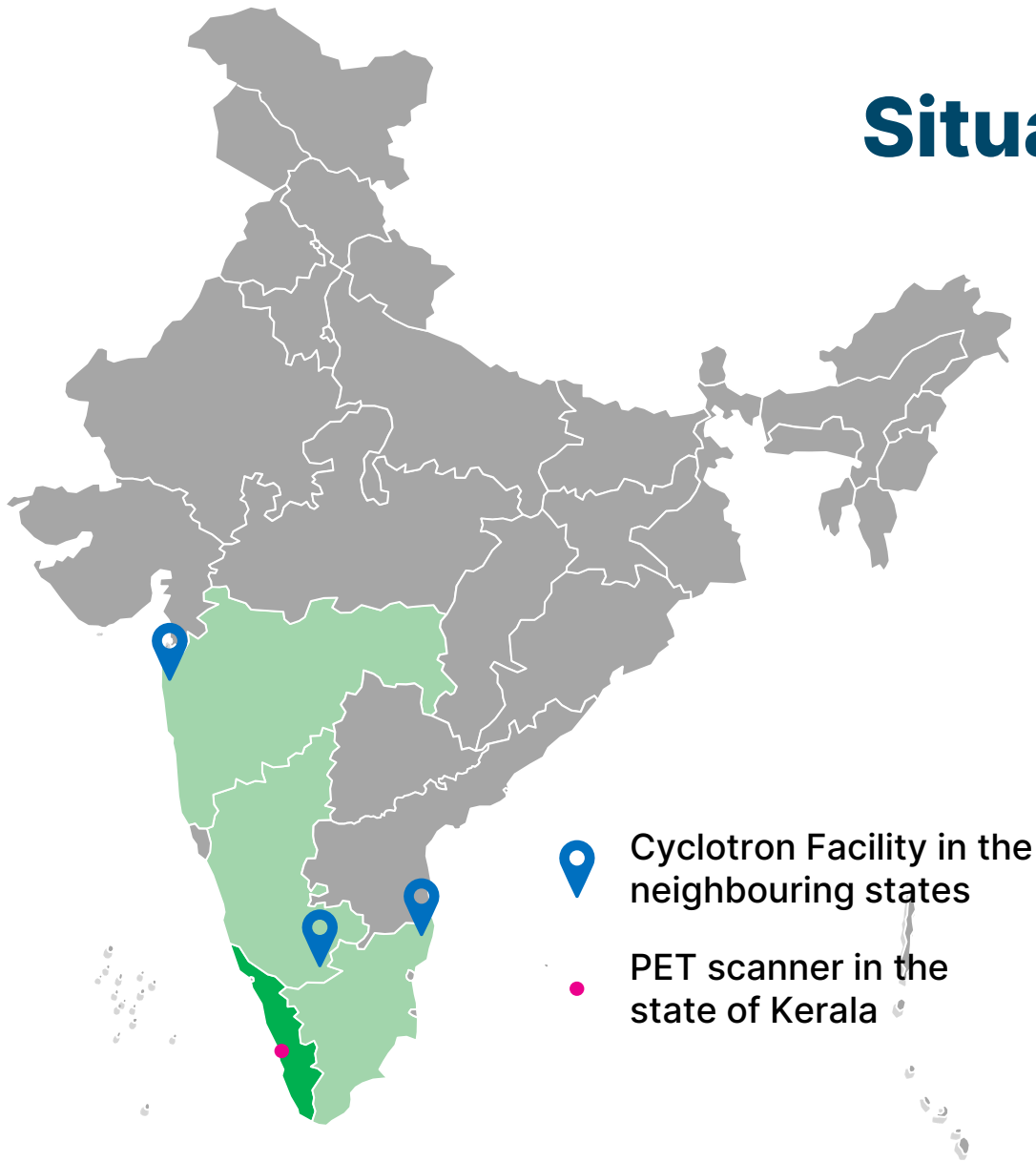
Source: National Institute for Transforming India (NITI) AAYOG, Govt. of India



Situation in Kerala before 2013

0.03

PET Scanners per
million population!



- Only one PET scanner (installed in 2008)
- No cyclotron facility in the state
- Available cyclotrons and PET scanners in the neighbouring states were 500 – 1500 kms away
- Patients and their bystanders had to spend more time and money for taking the PET scan

Molecular Cyclotrons, Kochi

First and only medical cyclotron facility in the state of Kerala





Cyclotron and Operation

- Siemens Eclipse HP (Self-Shielded) Cyclotron
- 11 MeV dual proton beam with 120 μ A current





Radiopharmaceutical Production

- GMP certified
- EU standards
- Sterile environment





Quality Control

- Thin layer chromatography (TLC)
- Gas chromatography (GC)
- Bacterial endotoxin test
- Sterility test

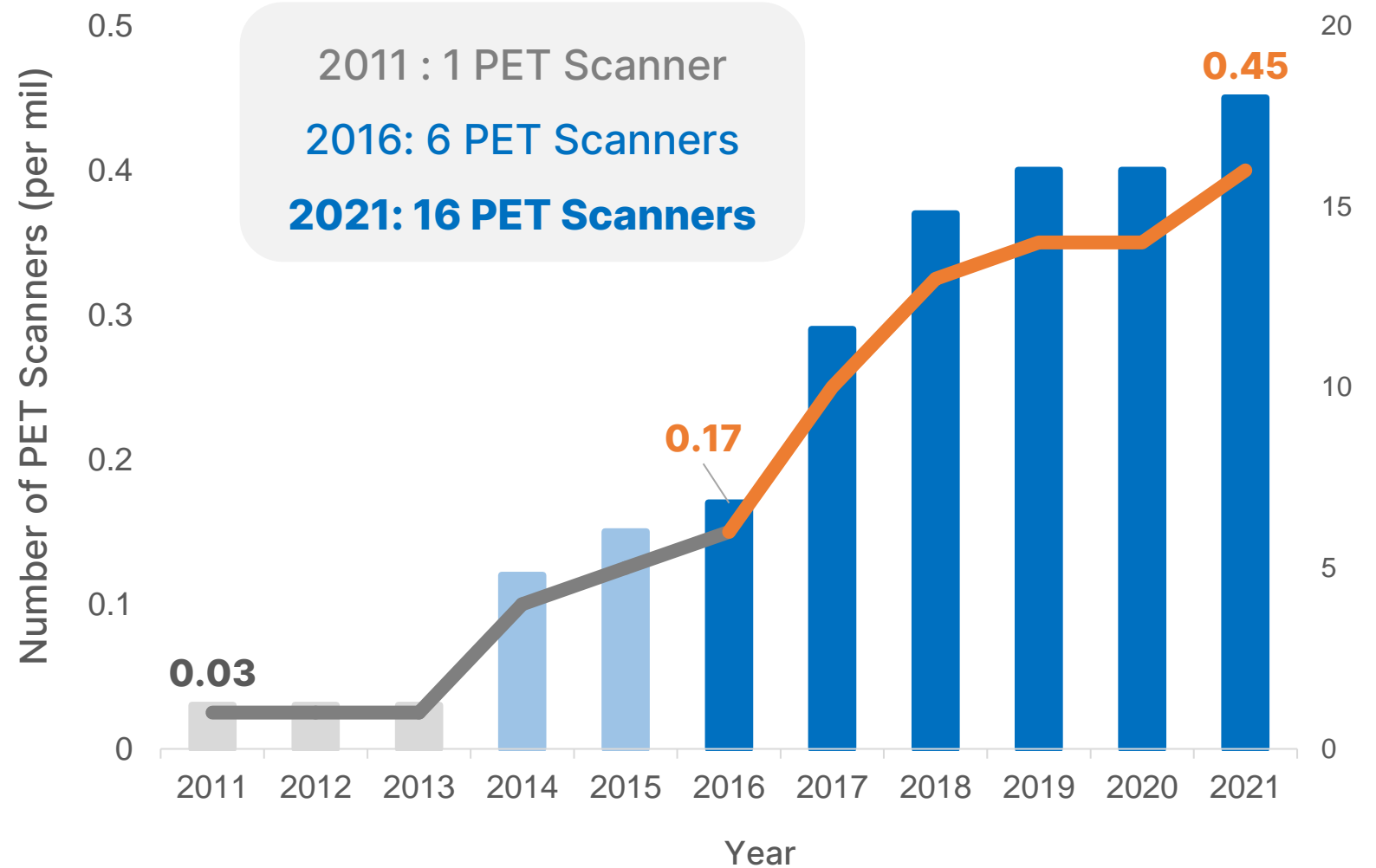
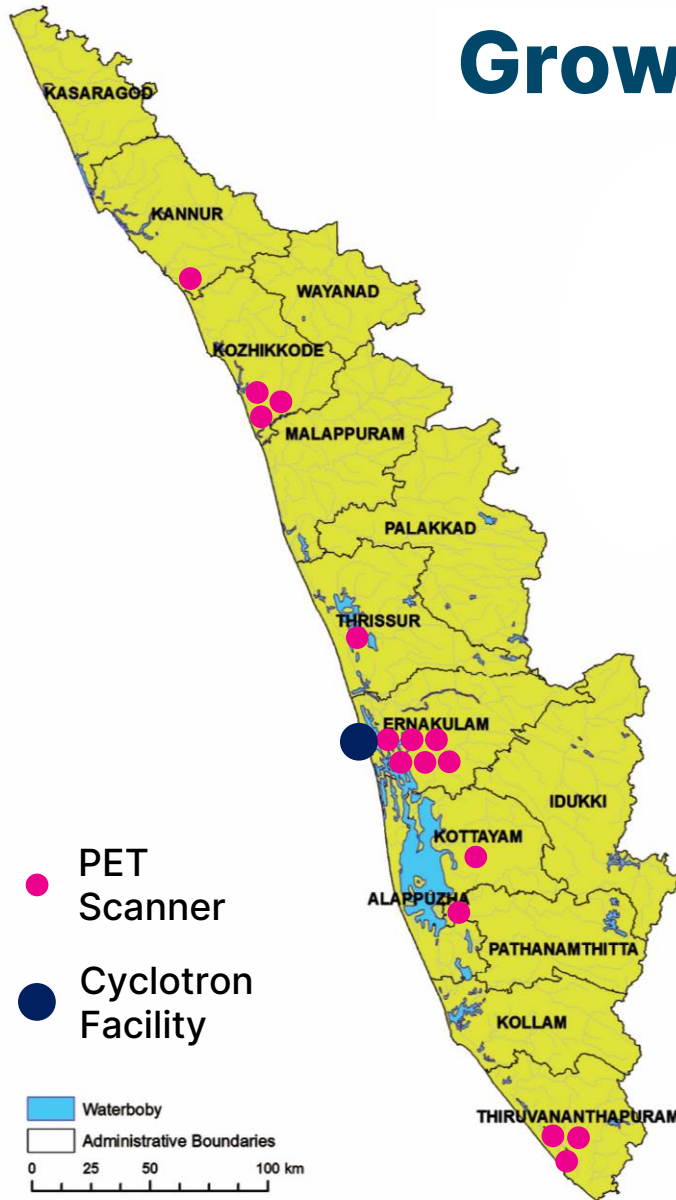


Beyond FDG!

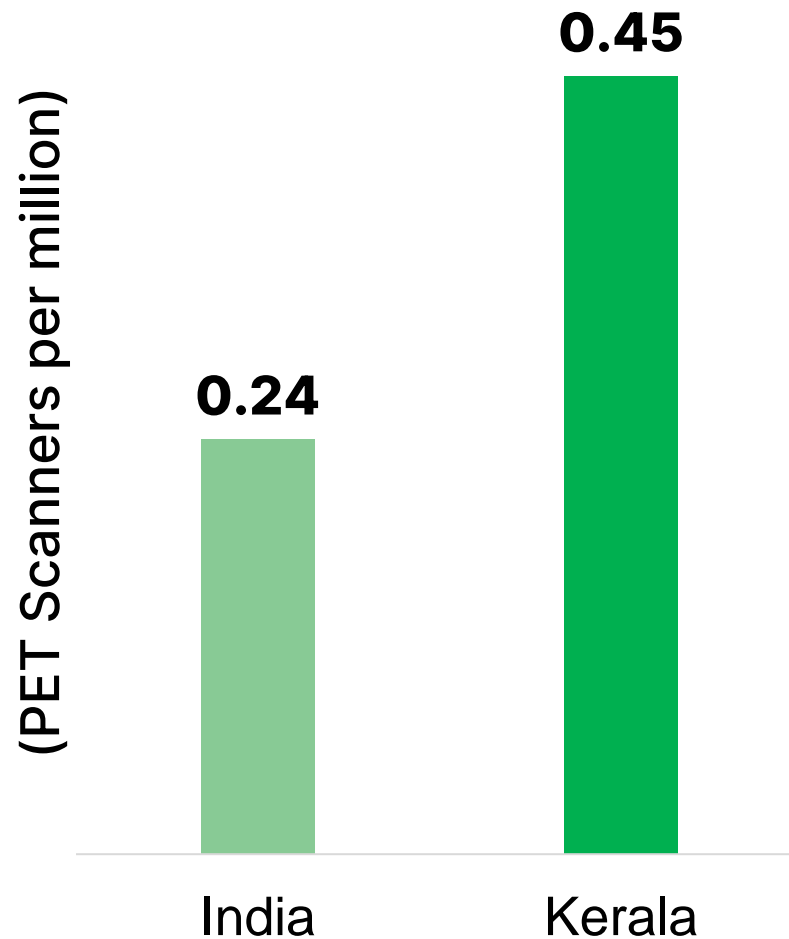
[¹⁸F] FDG	Oncology
[¹⁸F] FDOPA	Neurology/Psychiatry and Oncology
[¹⁸F] FPSMA	Prostate cancer
[¹⁸F] Fcholine	Prostate cancer and Parathyroid adenoma
[¹⁸F] NaF	Bone metastasis
[¹⁸F] FMISO	Hypoxia
[¹⁸F] FET	Primary brain tumours
[¹⁸F] FLT	Brain tumours



Growth of PET Scanners in Kerala

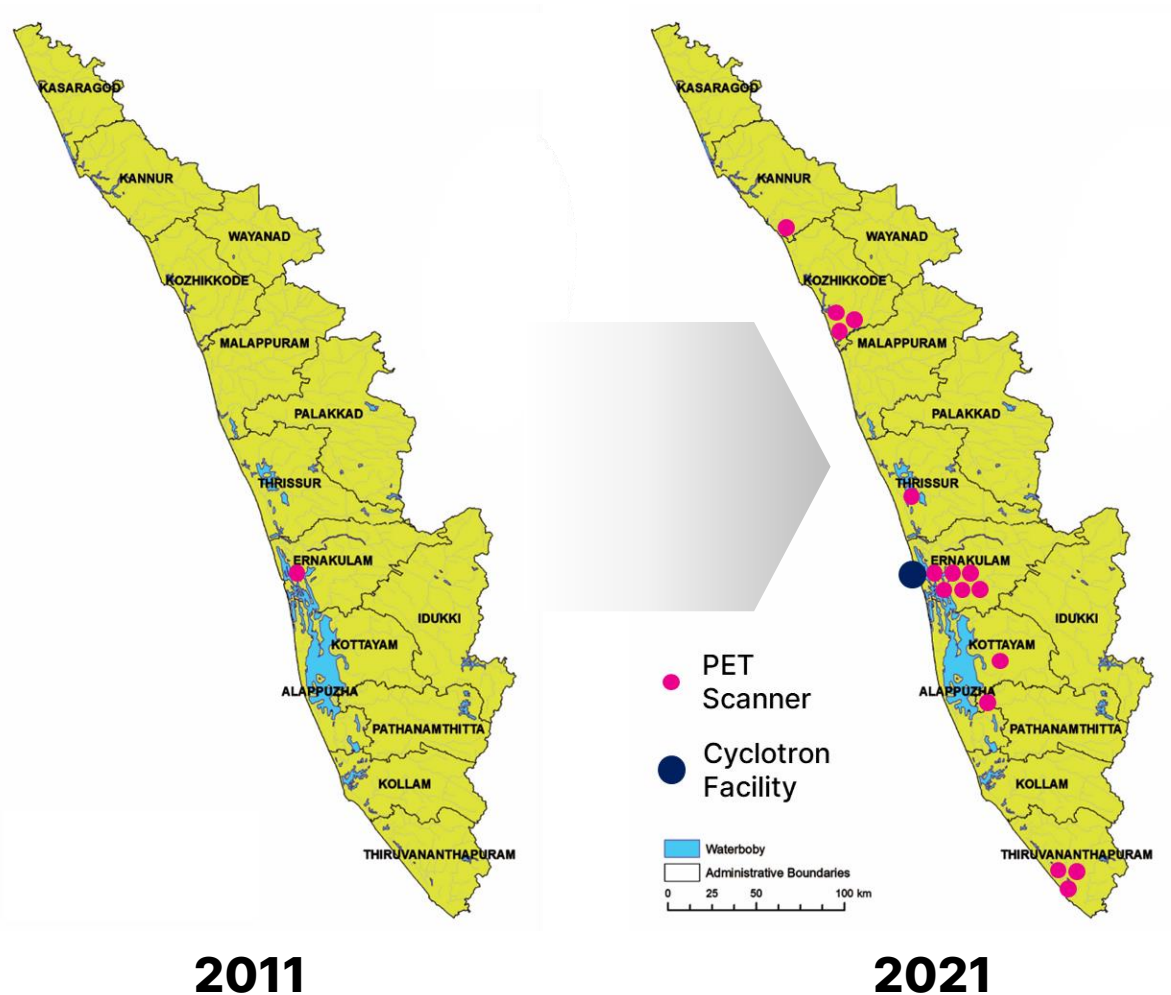


Socioeconomic Impact to the State



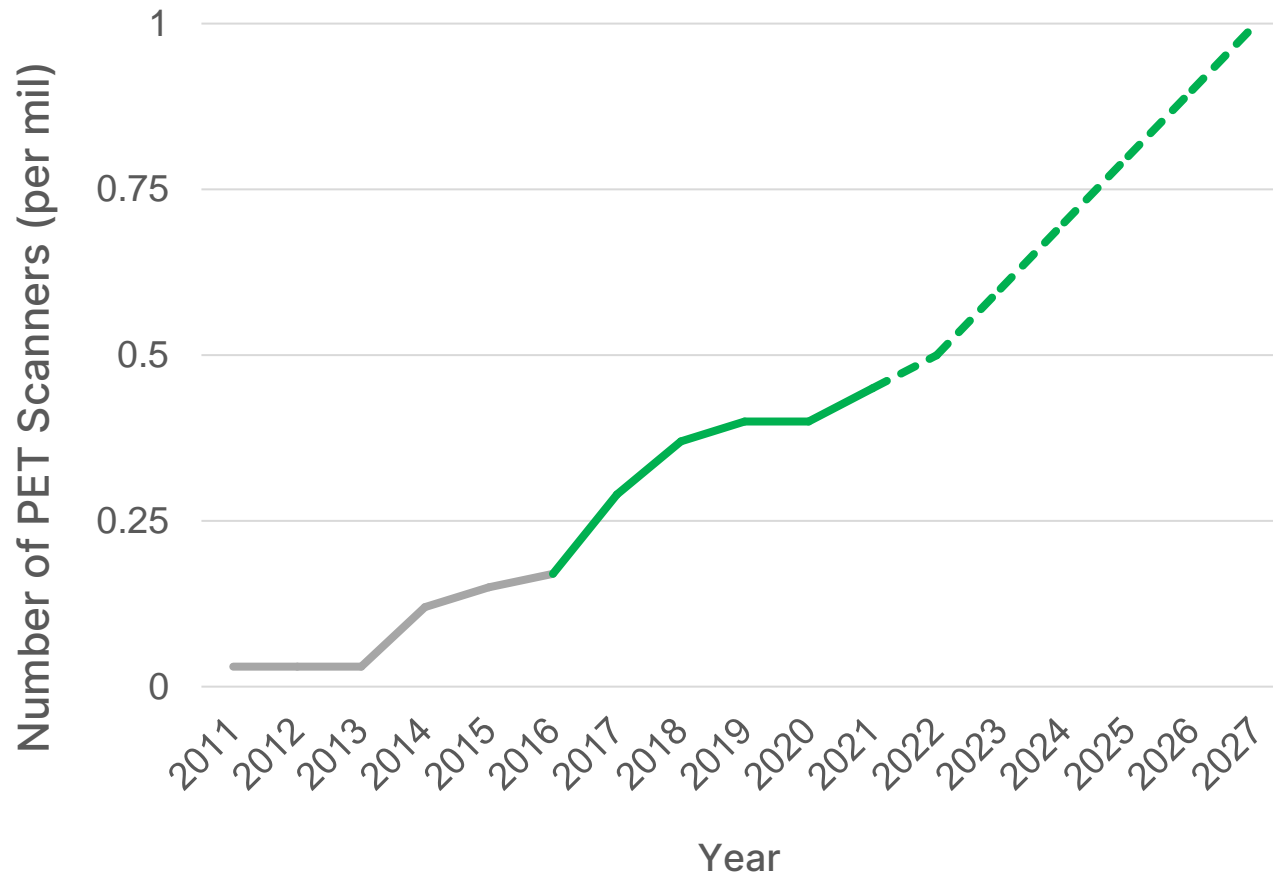
- **15 new PET scanners** installed in the last eight years
- **Reduced inequities** in access to diagnostic nuclear medicine
- **Supports ~50,000 patients** per year for taking PET scan

Socioeconomic Impact to the State



- Availability of **PET scanners within 50 km range**
- **Local and reliable availability** of PET radiopharmaceuticals
- Radiopharmaceuticals **other than FDG at affordable cost**
- **Reduced the cost** of PET scan to less than half
- **Supports 20 PET scan centres and around 150 nuclear medicine professionals** in the state and the neighbouring state

Looking forward to..



- Estimates 36+ million population in the state in 2027
- Kerala requires at least 36 PET scanners to reduce inequities in access to diagnostic nuclear medicine
- Our second cyclotron facility is under planning in another location



MOLECULAR
Cyclotrons Pvt. Ltd.



VON GAHLEN
FOR SURE

WORKING ACCORDING TO GMP GUIDELINES

MCPL's new hot cell installation complies with all European standards and regulations. From the start, the customer insisted on working according to GMP guidelines. These guidelines provide requirements for manufacturers to assure that their products are consistently high in quality. In Europe, this is standard for the production and sale of radiopharmaceutical products, but not yet mandatory in India.

Dr. Ajith, Owner of MCPL: "Our organization wanted to establish the best commercial cyclotron facility in India. With the EU GMP standards we ensured the quality in radiopharmaceutical production and radiation safety for the staff and working environment." MCPL is the first radiopharmaceutical company in India to do so. Their installation is also futureproof, because it's probably a matter of time before the Indian government requires working according to GMP guidelines too.



Team **MOLECULAR**



Thank you

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