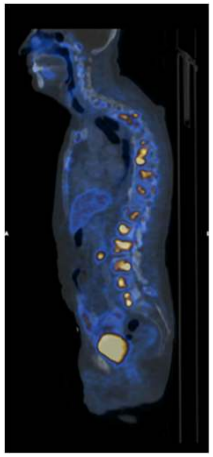
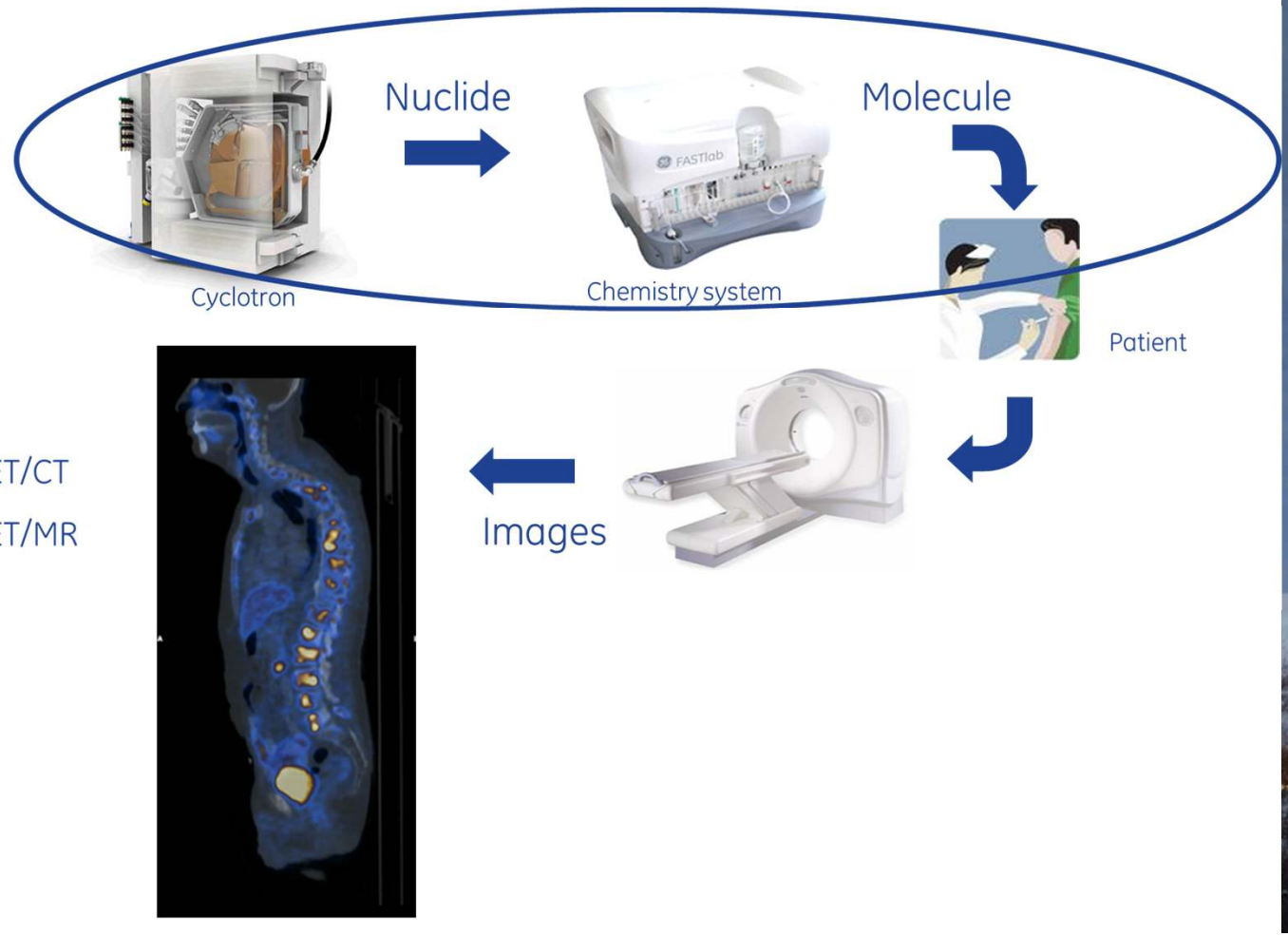
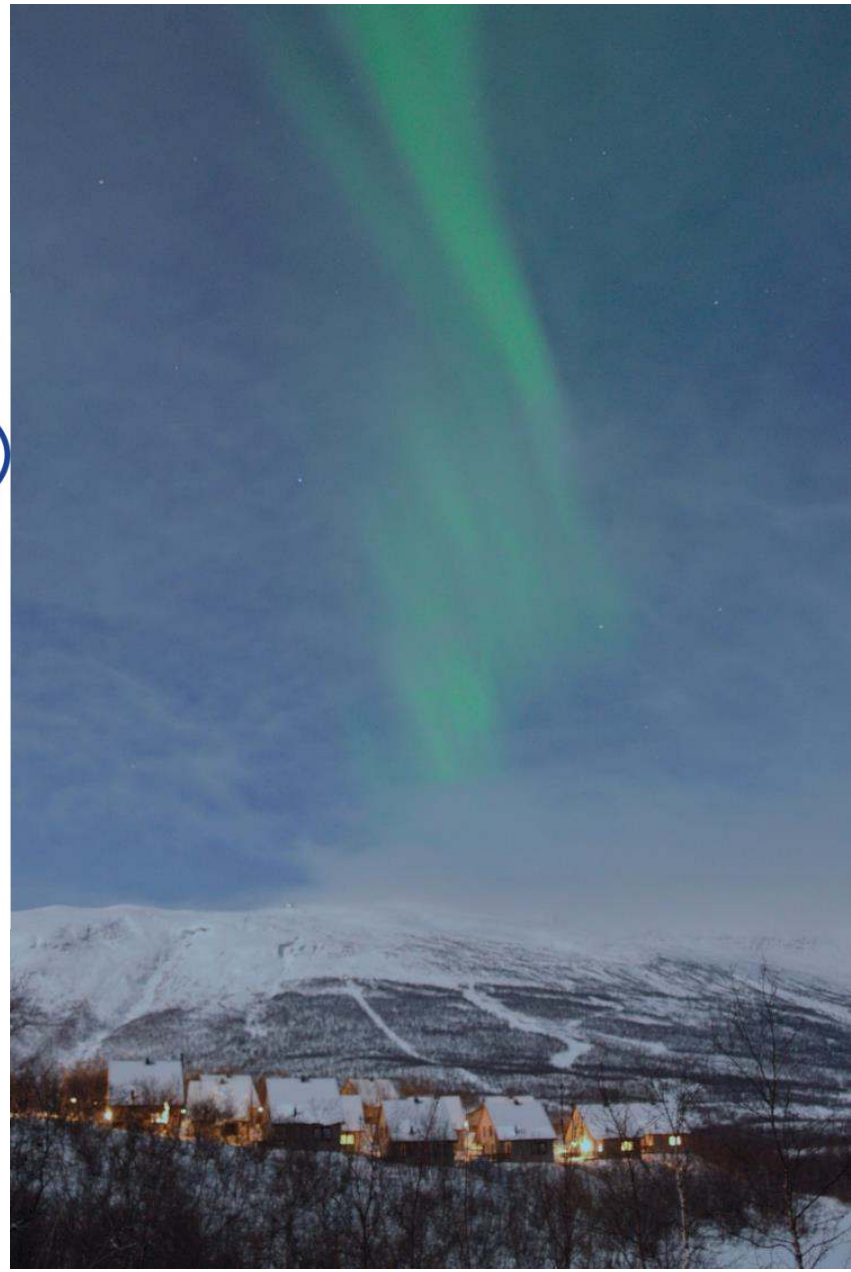
Synkronisering av diagnostik och terapi med “Big Science”



Erik Strömqvist
General Manager Cyclotrons & TRACERcenter
GE Healthcare
May 7, 2019

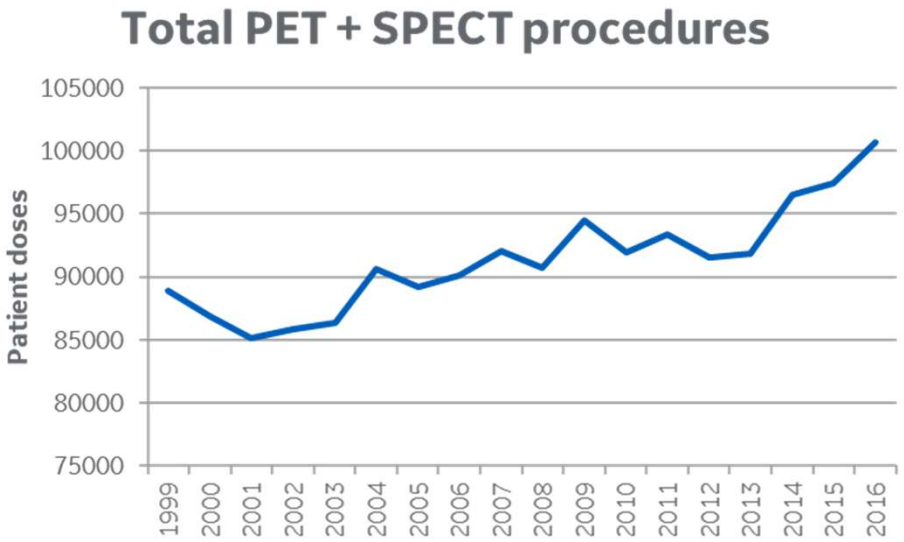
Positron Emission Tomography (PET)

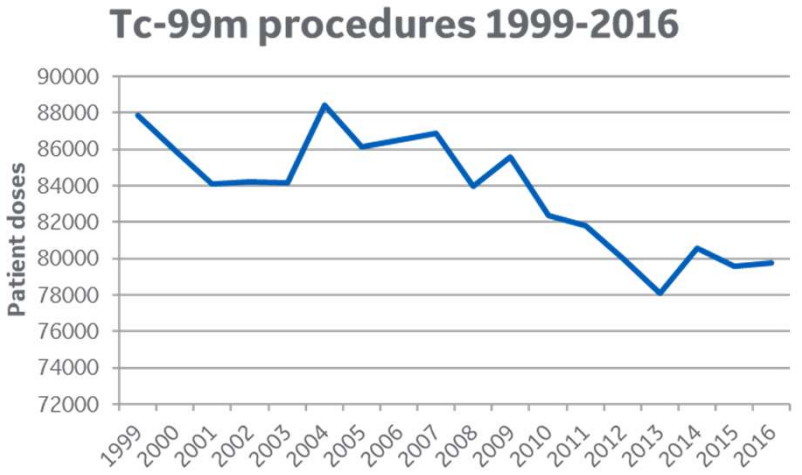


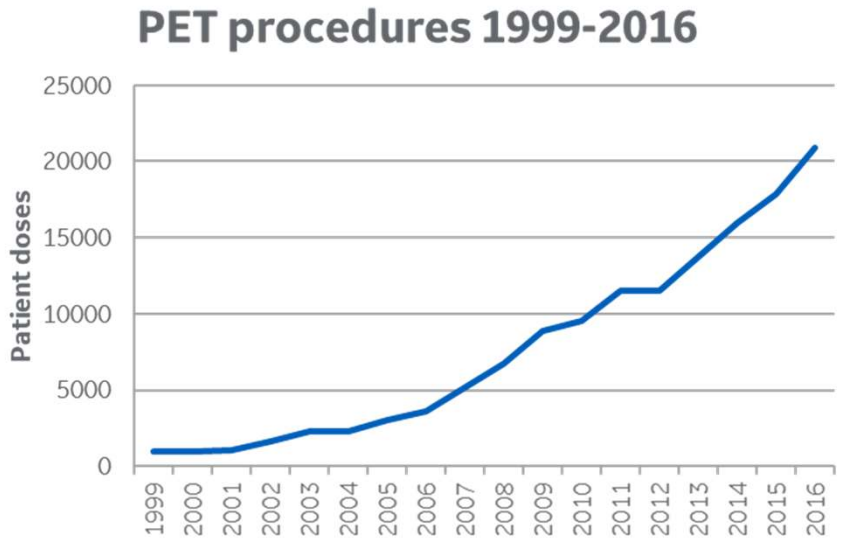


PET and SPECT (Tc99m) in Sweden

Source: Swedish Radiation Safety Authority (www.ssm.se)
retrieved April 2018







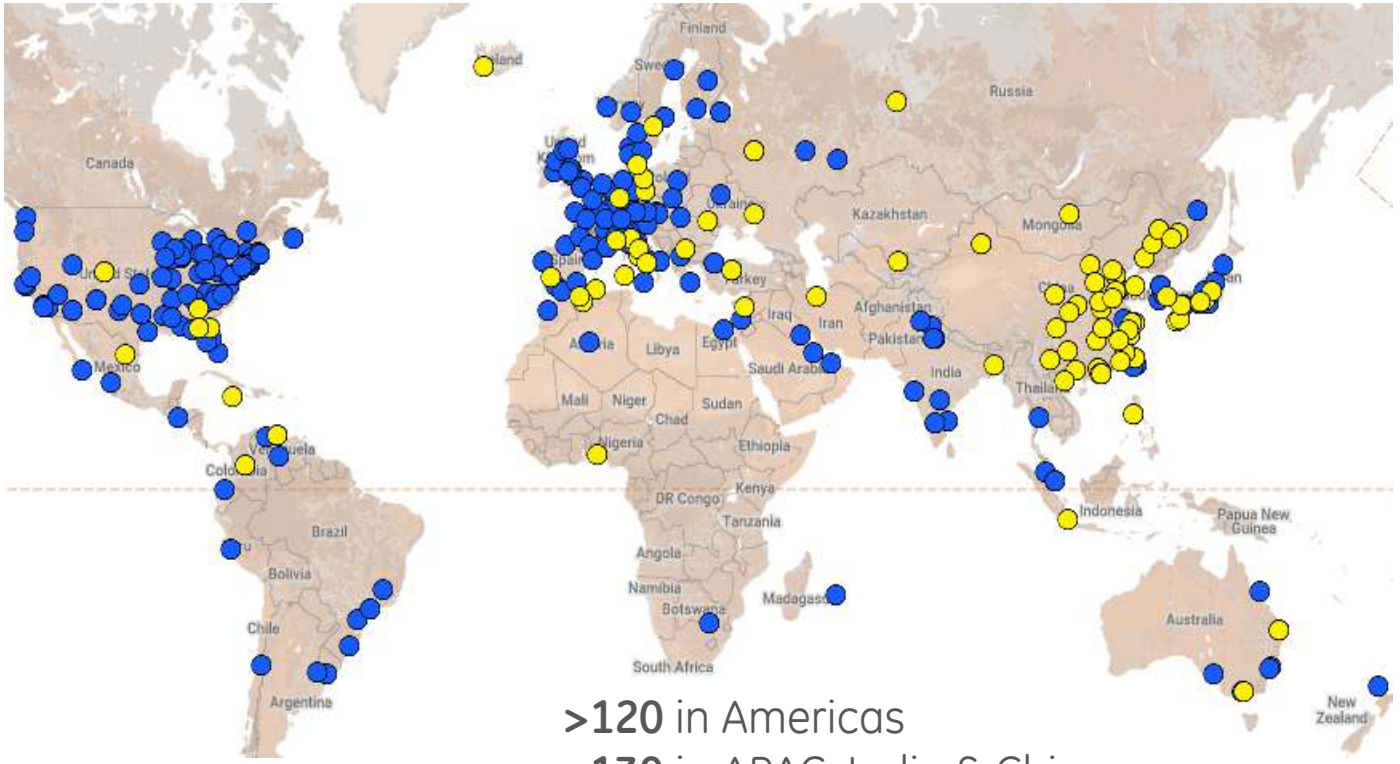
GE Healthcare Cyclotrons & TRACERcenter – Global HQ

Legal entity:	GEMS PET Systems AB
Location:	Uppsala, Sweden
Business:	Development, Manufacturing and Service of PET Cyclotrons & TRACERcenter
Employees:	110
Managing Director:	Erik Strömqvist

Installed base

~400 GEHC cyclotrons installed worldwide

290+ PETtrace
110+ MINItrace



>120 in Americas
>130 in APAC, India & China
>140 in EGM/Africa & Europe

Total PET Cyclotron IB
~1100 Systems

IBA	~225
Siemens	~225
Sumitomo	~150
Other	~100

GEHC - largest cyclotron installed base

Enable PET Imaging

Total cost of ownership, TCO

Reduce number of users/operators

Cost per dose

Ease of use

Footprint/Space

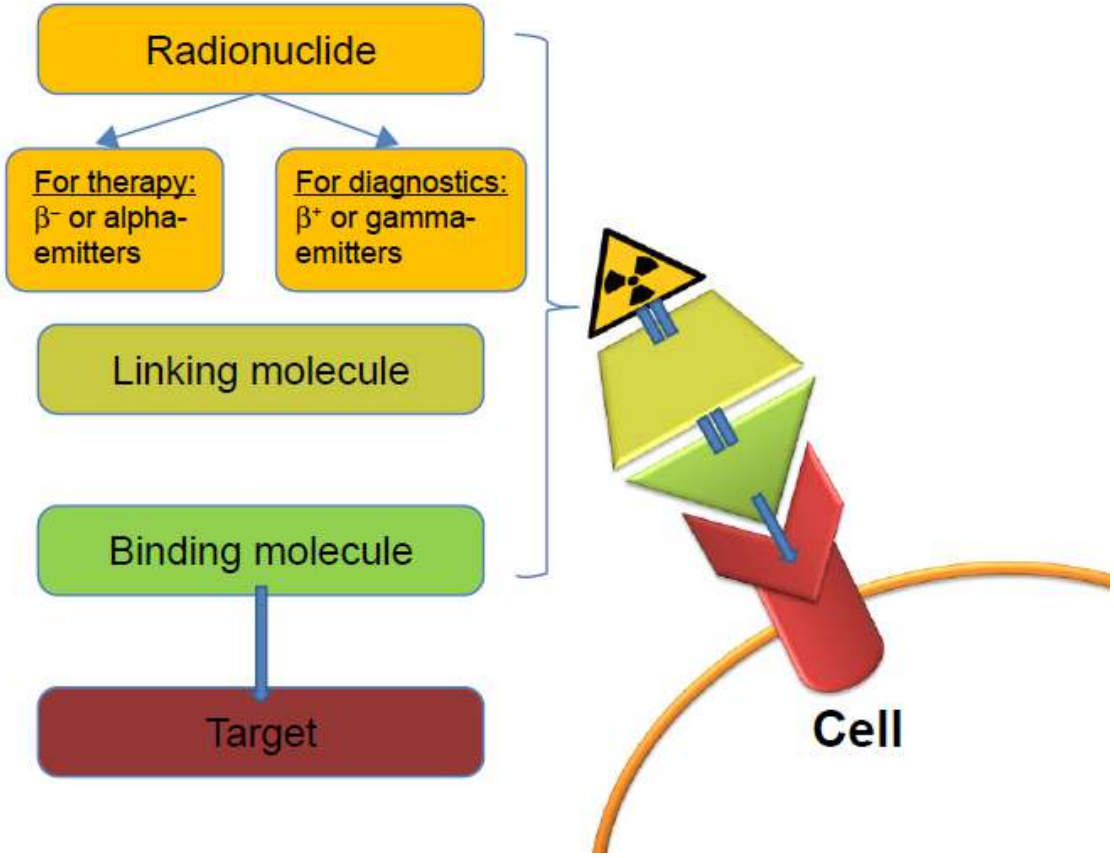
Interface between equipment/suppliers

	US	Italy	Sweden	Brazil	India	China
Population (MM)	320	61	10	205	1250	1325
Population/PET scanner (K's))	205	470	715	3,150	22,700	4,800
PET/Cyclo	6.8	3.2	2.8	6.5	3.4	1.9
IB PET	1560	130	14	65	55	278
IB Cyclo	230	41	5	10	16	15

Simplification and Miniaturization

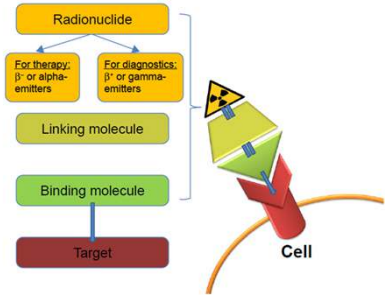
Theranostics Concept

Diagnostics and therapy synchronized with same target binding molecule.



Source: OncoTargets and Therapy 3 October 2017, Yordanova et. al.

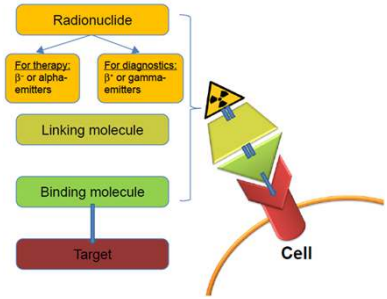
Theranostics



Diagnostics and Therapy synchronized with same target binding molecule.

- ✓ Diagnostic radionuclides PET:proton excess: C11, N13, F18, Sc44, Cu61, Ga68 (Cyclotron produced)
- ✓ Therapy radionuclides:neutron excess: Cu67, Lu177, At211 (Reactor produced)
- ✓ Diagnostic – Therapy pairs: Sc44-Sc47, Cu61-Cu67, Ga68-Lu177, F18-At211

Theranostics Examples



1. **NETSPOT and LUTATERA for Neuroendocrine tumours**

Novartis to buy French cancer specialist AAA for $3.9 billion - Reuters
https://www.reuters.com/...novartis.../novartis-to-buy-french-cancer-specialist-aaa-for-...
Oct 29, 2017 - **Novartis** has agreed to buy French-based Advanced Accelerator Applications (**AAA**) for $3.9 billion, giving it a platform in radiopharmaceuticals and access to a new therapy for the kind of cancer that killed Steve Jobs.

Novartis completes tender offer for Advanced Accelerator Applications ...
https://www.novartis.com/.../novartis-completes-tender-offer-advanced-accelerator-ap...
Jan 22, 2018 - **AAA** is a radiopharmaceutical company that develops, produces and commercializes Molecular Nuclear Medicines. The completion of the Offer bolsters **Novartis'** oncology portfolio with the addition of Lutathera® (lutetium Lu 177 dotatate), a first-in-class RLT product for neuroendocrine tumors (NETs), ...

2. **Prostate specific membrane antigen (PSMA)***

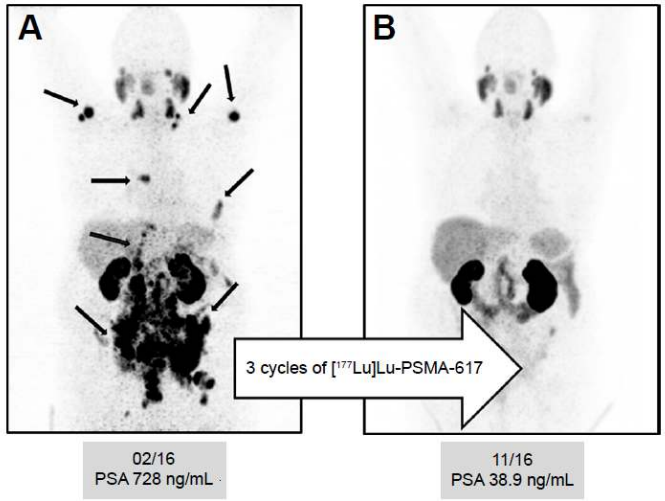


Figure 4 (**A**) Pre-therapeutic [^{68}Ga]Ga-PSMA-11 images* of a patient with multiple lymph node, peritoneal, and bone metastases (arrows), and history of chemotherapy (first and second line) with enzalutamide and abiraterone. (**B**) After three cycles of [^{177}Lu]Lu-PSMA-617, the follow-up images showed a very good response with a substantial PSA decline.
Note: *Maximum-intensity projection (MIP) PET image is a visualization technique that provides an initial overview of the case.

*Source: OncoTargets and Therapy 3 October 2017, Yordanova et. al.

Future

cyclotron, manual chemistry

academic, research driven PET tracer development

cyclotron, synthesis modules

Reimbursable tracers driving clinical production standardization

cyclotron, cassette chemistry, equipment

Turn-key equipment solution for PET tracer production

Complete equipment, regulatory

GMP compliant turn-key PET radiopharmaceutical production

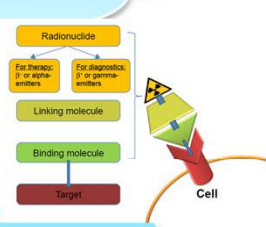
Complete, economical, simple PET radiopharmacy

Bringing PET to every hospital

Enhanced cyclotron capabilities with turnkey support

PET and SPECT radiopharmaceutical production

Theranostics



1998 2001 2008 2012 2016


PETtrace 800