NEA
NUCLEAR ENERGY AGENCY

Nuclear Medicine: uses, products, technologies and key players

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Outline

1. Overview of Basics of Innovative Radioisotopes
2. Market Size of Radiopharmaceuticals
3. Actions to be taken to facilitate economic growth and promote use in the medical field without hindrance

Overview of Basics of Innovative Radioisotopes

Radiation emitted from radioisotopes used in medicine

- The types of isotopes used in radiopharmaceuticals have been increasing year by year.
- While the commercialization of PET and β-emitting therapeutic radiopharmaceuticals has been remarkable in recent years, R&D on α-emitting therapeutic radioisotopes, which possess high cancer-killing capabilities, is also active.

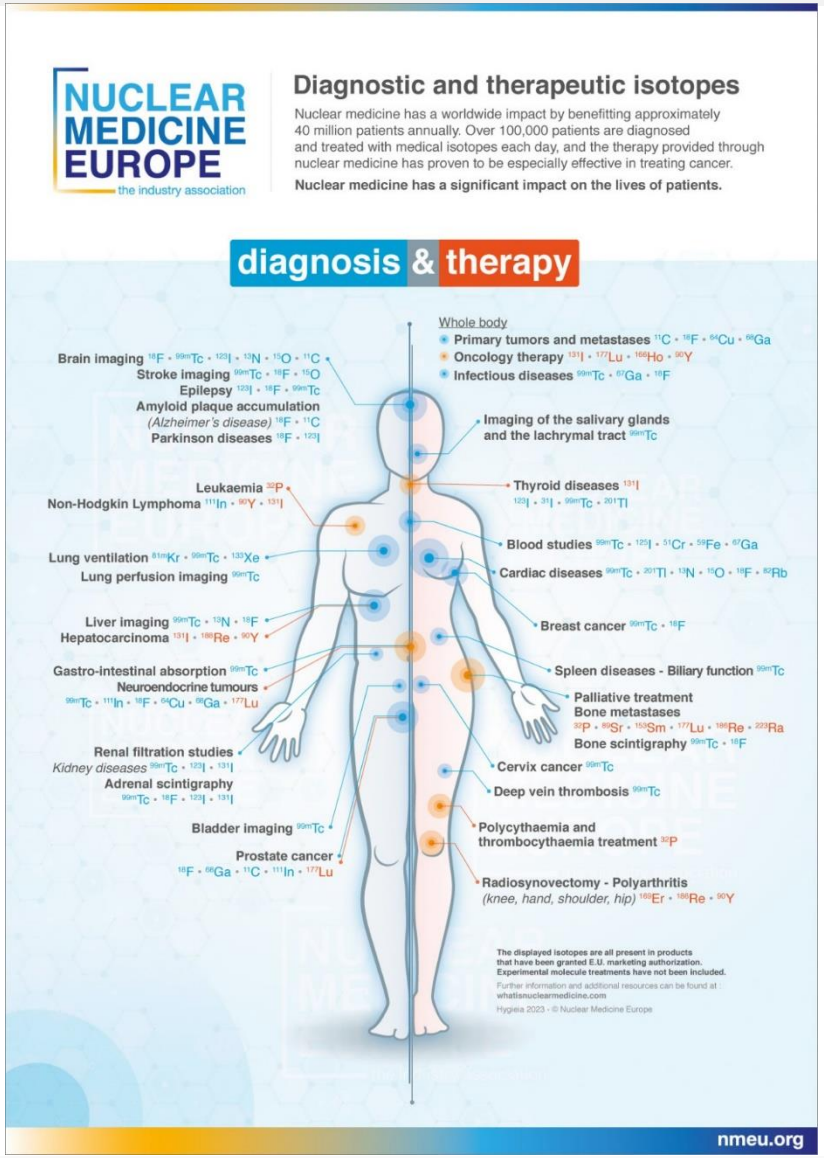
For diagnostics		For treatment	
		Lower energy, Longer path length	Higher energy, Shorter path length
SPECT	PET	β particle	α particle
γ ray	positron		
Mo-99/Tc-99m, I-123, (Tb-155)…	F-18, C-11, N-13, O-15, Ge-68/Ga-68, Cu-64, (Zr-89,Tb-152, Sc-44)…	Y-90,I-131, Sr-89,Lu-177, Ho-166,Sm-153, Re-188, (Sc-47,Cu-67, Tb-161)…	Ra-223, (At-211, Ac-225, Pb-212, Tb-149)…

NMEU Hygieia Poster (The 2023 updated edition)

-The displayed isotopes are all present in products that have been granted EU marketing authorization
-Experimental molecule treatments have not been included

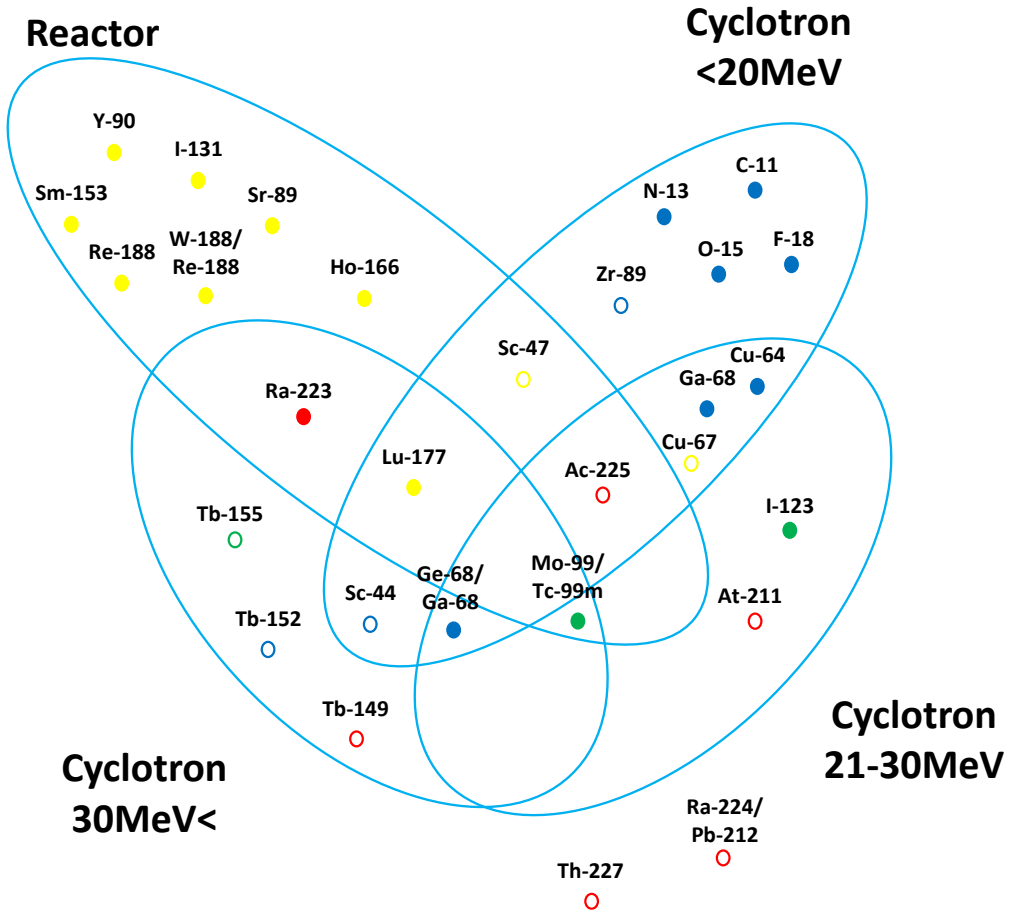
The introduction of new radiopharmaceuticals using isotopes already on the market and new pharmaceuticals using novel isotopes is expected to further expand:

- applications
- target diseases
- diagnostic or treatment options



Overview of Basics of Innovative Radioisotopes

Irradiation process to produce radioisotopes

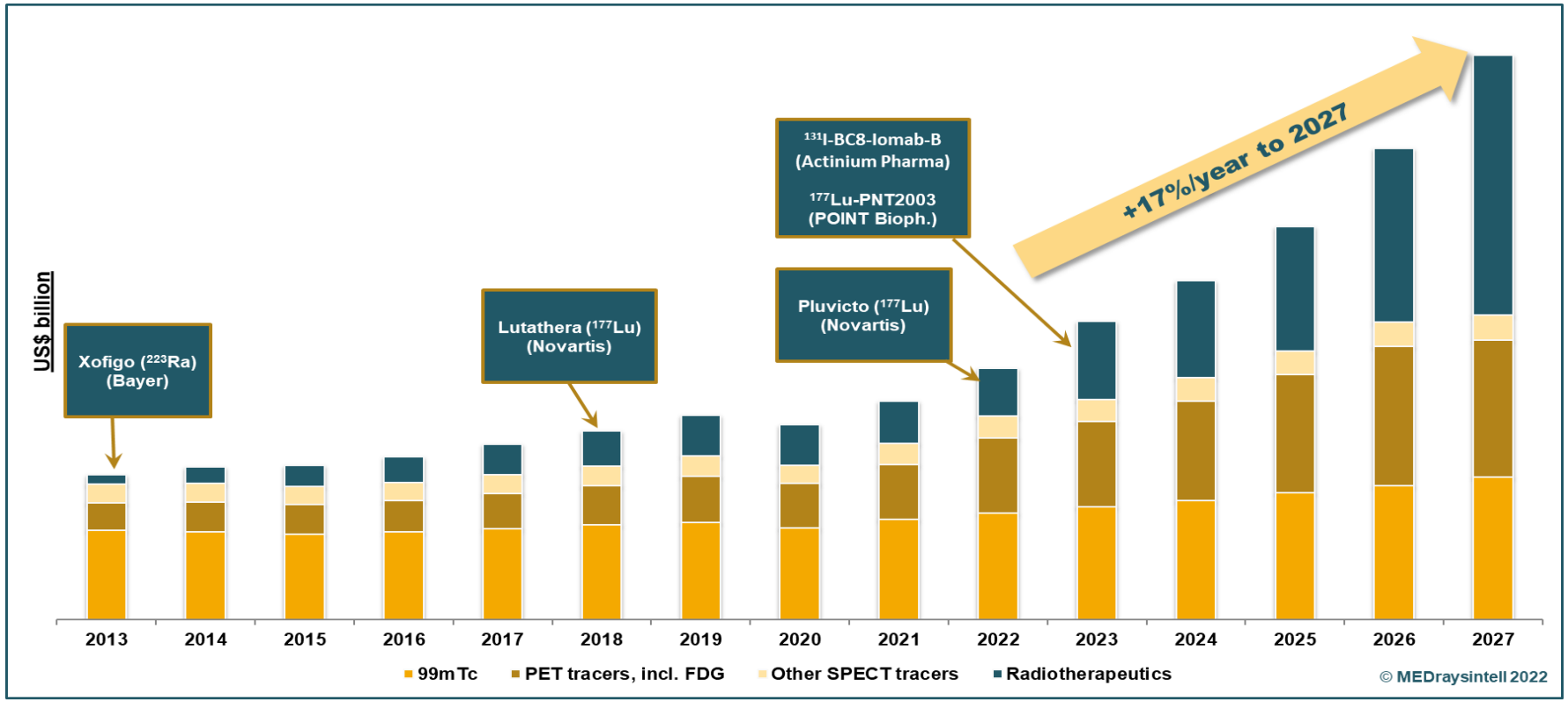


Green: for SPECT, Blue: for PET, Yellow: for therapy (β-emission) ,
Red: for therapy (α-emission)
Blank circles: radioisotopes not used in commercialized pharmaceuticals

- Not only reactors, but also cyclotrons are key for irradiation to produce radioisotopes
- Majority of β-emitting radioisotopes are reactor-based; security of irradiation capacity of reactors is important
- Majority of radioisotopes for PET are produced with cyclotrons whose power is lower than 20 MeV; considering their short half-lives, investment promotion are needed for development of local production
- Some radioisotopes in R&D phase are produced by high-energy cyclotrons; the challenge is how to meet global demand

Market Size of Radiopharmaceuticals

- The PET market has grown over the past 10 years and is expected to continue growing
- The market for therapeutic radiopharmaceuticals is projected to grow dramatically in the near future



Source: MEDraysintell Nuclear Medicine Report & Directory Edition 2022, www.medraysintell.com

Actions to be taken to facilitate economic growth and promote use in the medical field without hindrance

- Understand the gap between demand and supply capacity
- Establish an economically robust structure through government policy frameworks supported by budget allocations to stimulate investments from the private sector
- Organize a cross-sector platform for a various stakeholders to discuss challenges and strategies
- Training of personnel to handle radiopharmaceuticals and development of an attractive employment environment
- Streamlining the approval process and ensuring safety for the rapidly growing number of therapeutic radiopharmaceuticals, and establishing a consistent regulatory framework

Thank you for your attention

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