



From a European Astatine-211 Network to a World Astatine-211 Community

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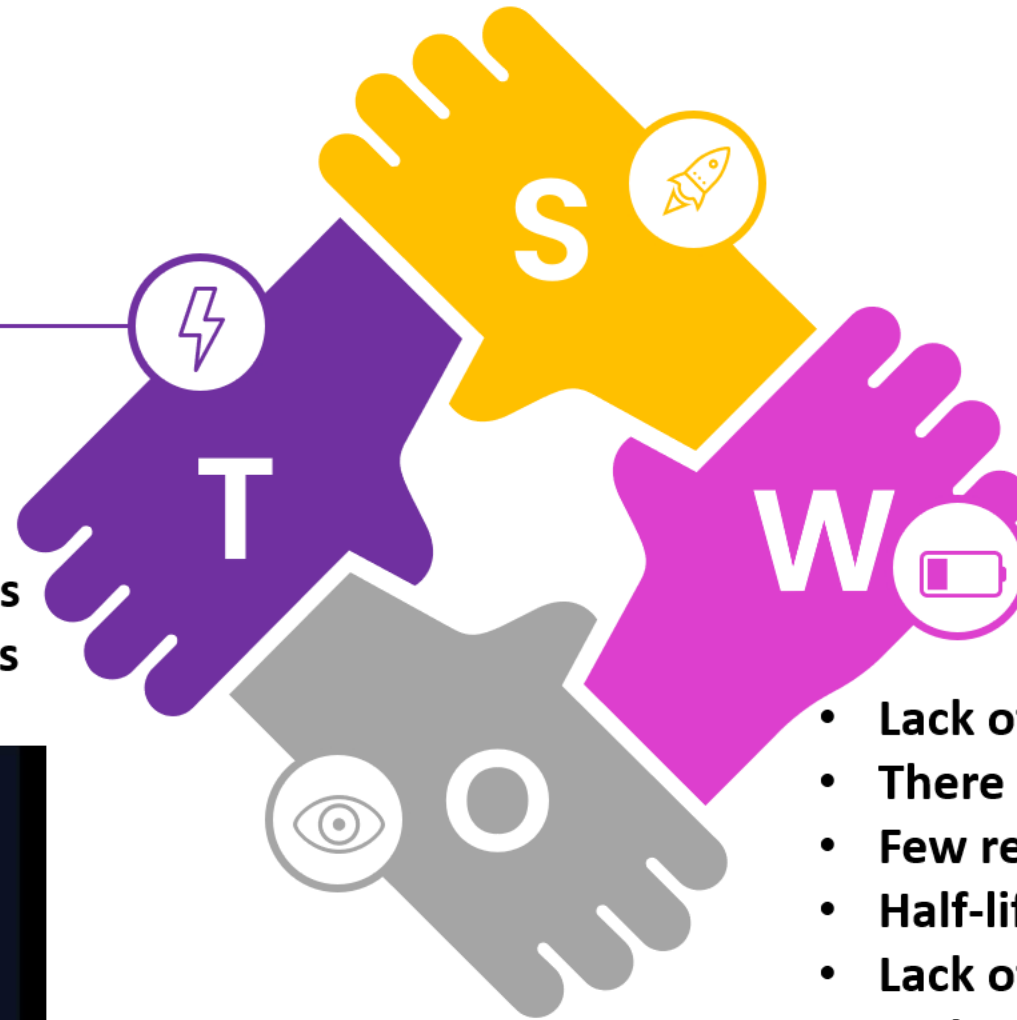
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« SEVERAL REASONS **not** TO CHOOSE ^{211}At »

THREATS

- No increasing industrial interest
- No better accessibility
- No better therapeutic effects
- Unknown toxicity to patients



WEAKNESSES

- Lack of accessibility
- There is very little production centres in EU
- Few research centres are using ^{211}At
- Half-life is short for centralized production
- Lack of clinical POC
- Lack of Industrials involvement
- There is a need for a critical mass of users.

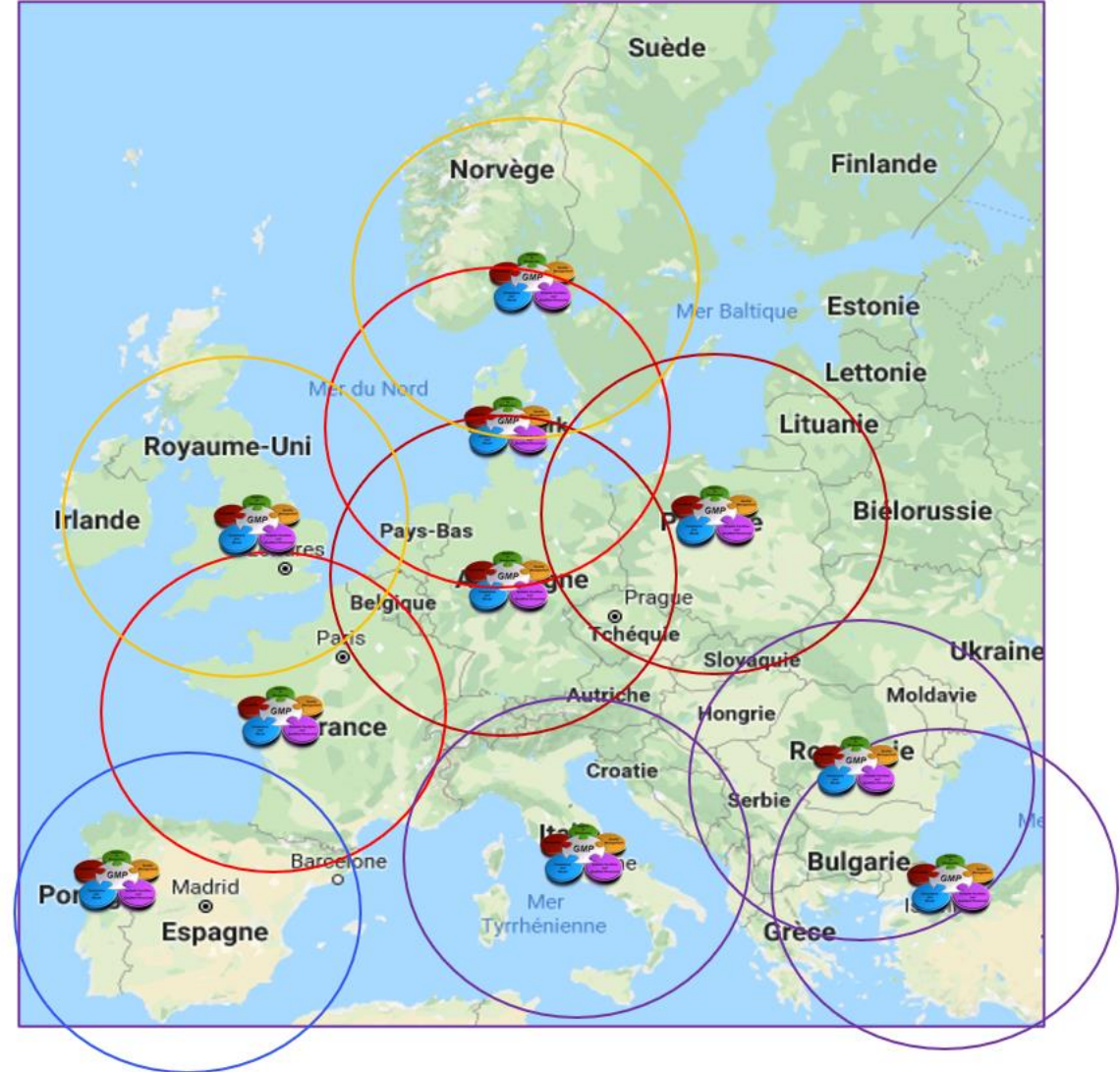
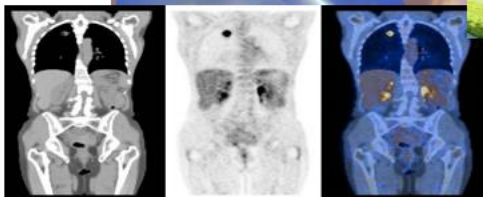
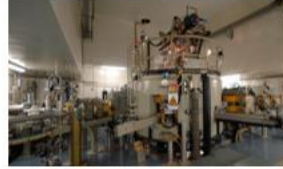


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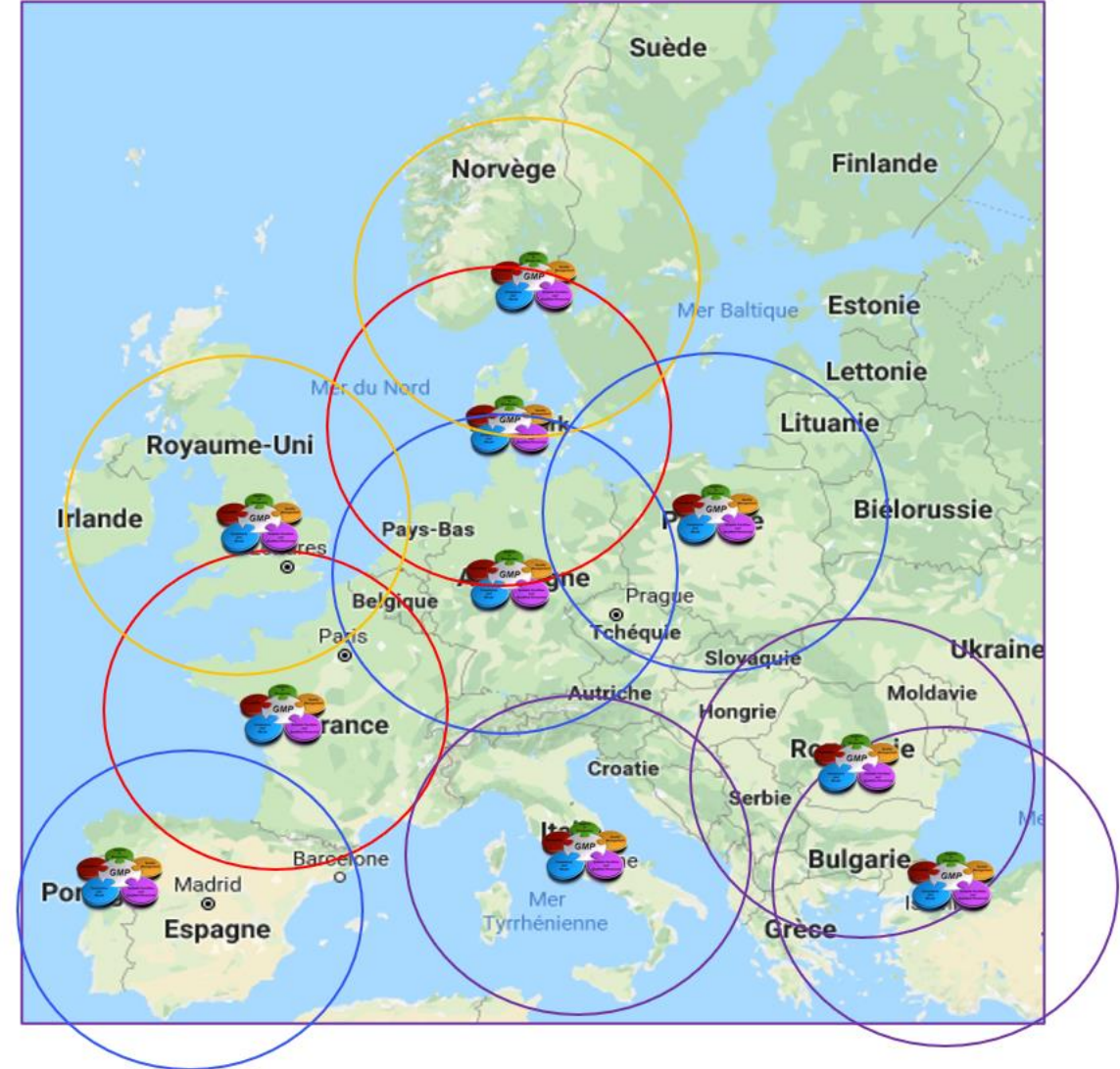
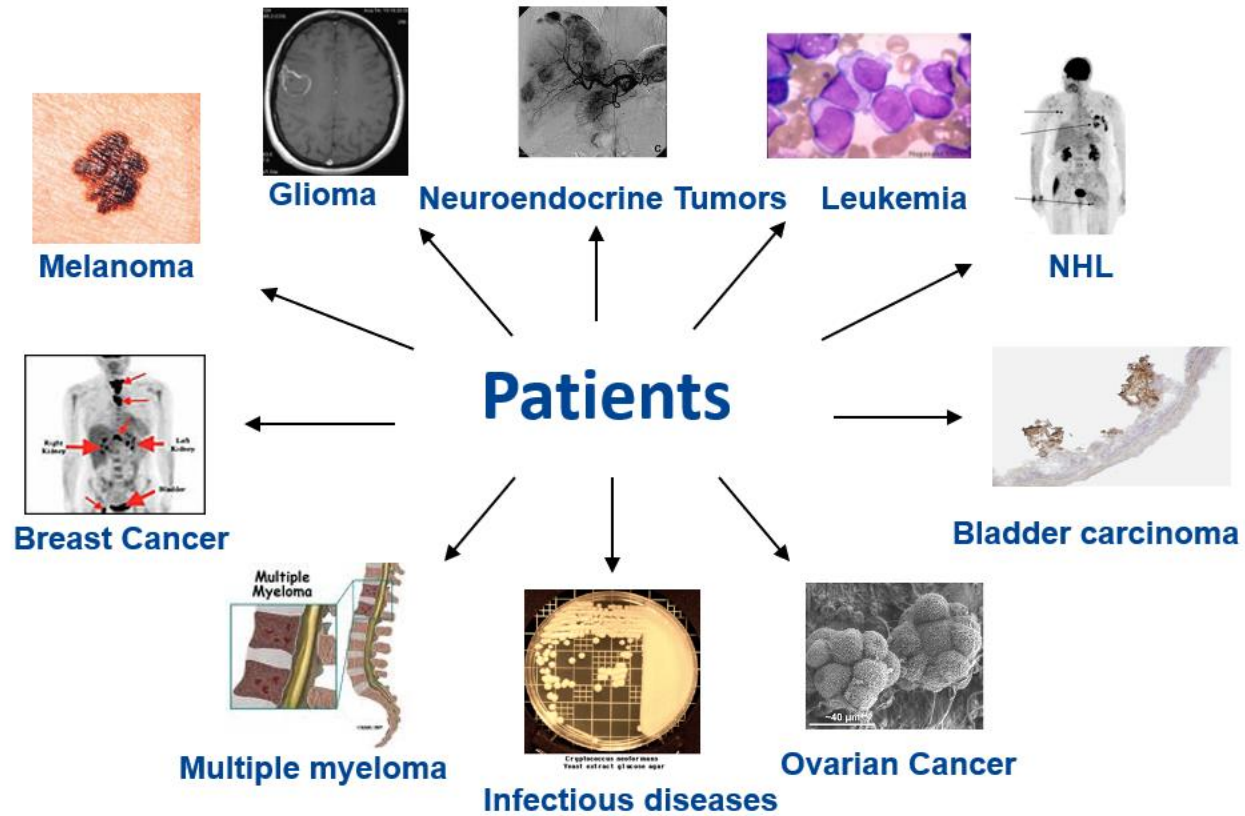
Network for Optimized Astatine labeled Radiopharmaceuticals

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²¹¹At-nodes



²¹¹At-nodes: specialized treatment centres



Current production sites:

- Copenhagen University (Denmark), internal beam, Scanditronix MC32 /MC35 (1.2GBq-2GBq)
- Arronax Nantes (France), extracted beam IBA 70, (1GBq-1.5GBq)

Production sites starting soon:

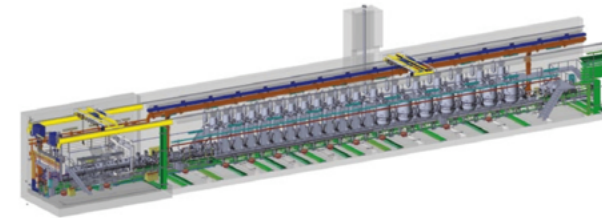
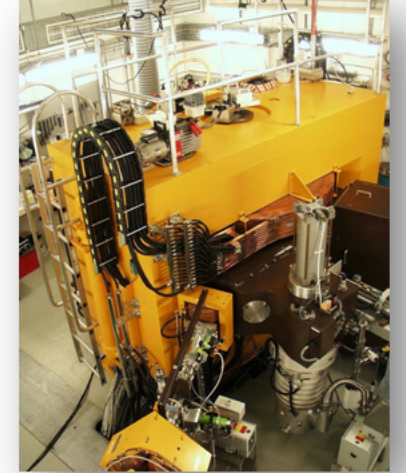
- Birmingham University (UK), extracted beam, Scanditronix MC32 /MC35, (1GBq)- Ready on demand.
- Forschungszentrum Jülich, Germany, IBA 30 XP, extracted beam- Spring semester 2023
- Polatom Warsaw, Poland, IBA 30 XP, extracted beam- A year from now

Potential production sites:

- IFIN-HH, Magurele, Romania
- Budapest, Hungary (stage prospect)
- Nuclear Physics Institute of the CAS, Czech Republic

Alternatives: linac projects

- **COLIBRI**, (Hamburg, Germany) and **GANIL**, Caen France



Liquid delivery

^{211}At in aqueous (wet extraction)

^{211}At organic solvent (after distillation)

^{211}At -precursor

^{211}At -radiopharmaceutical

At high activities /
activity concentrations

**Potential
Radiolysis!**

Dry delivery

Irradiated target itself or scraped

Dry residue (after distillation)

High activity delivery

**Good starting material
for any kind of chemistry**

^{211}At chemistry is better known today and we can radiolabel:

- Small molecules
- Peptides
- Antibodies under different scaffolds

Several patented technologies

Lots of preclinical studies have been performed already with different vectors



Several clinical studies are ongoing in the USA, Japan & soon EU



ACCOUNTS
of chemical research

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Advances in the Chemistry of Astatine and Implications for the Development of Radiopharmaceuticals

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CONSPECTUS: Astatine (At) is the rarest on Earth of all naturally occurring elements, situated below iodine in the periodic table. While only short-lived isotopes ($t_{1/2} \leq 8.1$ h) are known, ^{211}At is the object of growing attention due to its emission of high-energy alpha particles. Such radiation is highly efficient to eradicate disseminated tumors, provided that the radionuclide is attached to a cancer-targeting molecule. The interest in applications of ^{211}At in nuclear medicine translates into the increasing number of

1. **22 member countries** in Europe + research groups in USA and Japan
2. Over **110** participants
3. Several International meetings have been organized
 - **Coming soon: Global meeting, Coimbra, 09-11 May, 2023**
4. Web site has been launched
 - <https://astatine-net.eu/>
5. 6 STSM (Short Term Scientific Missions) have been performed by PhD students
6. Expansion of the Network to academics and industrials is ongoing, registration is made through the web site.
7. Support of NMEU for the development of alpha emitters at the **European Parliament**

Industrial interest is increasing



Alpha Nuclide (Ningbo)



STRENGTHS

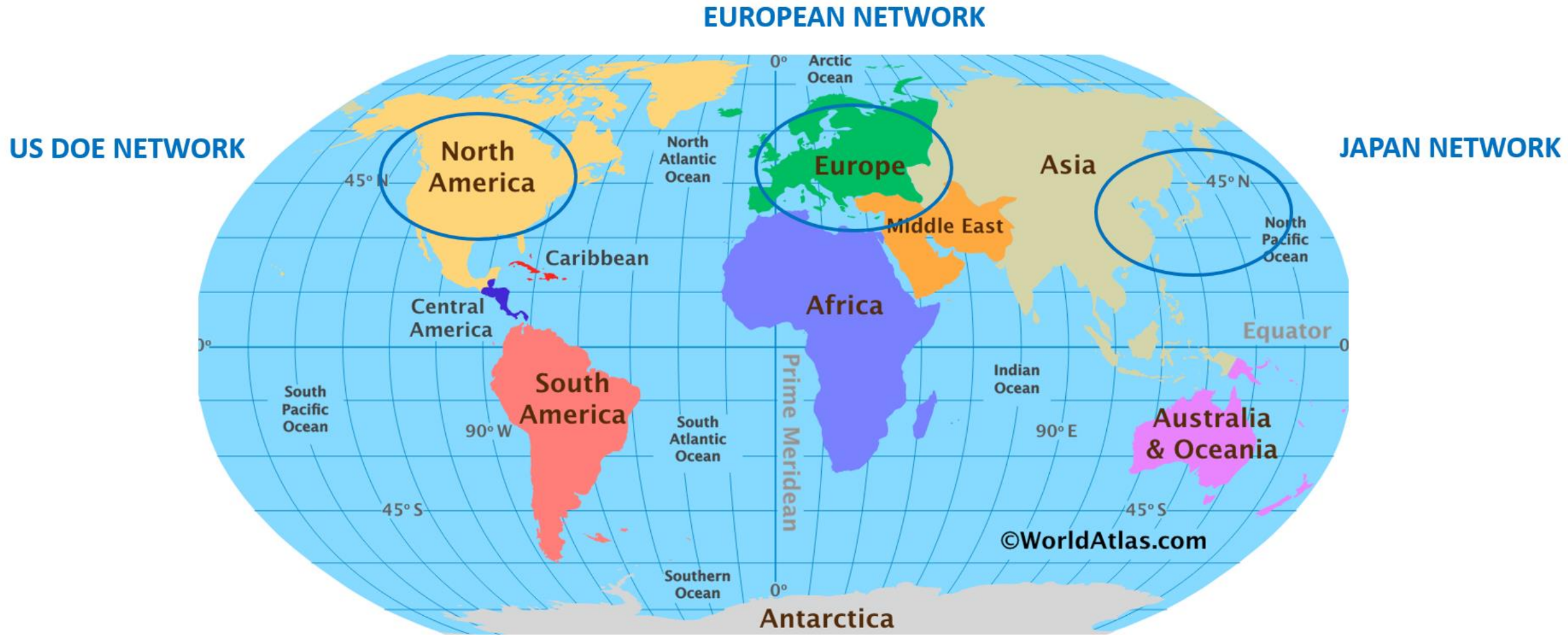


OPPORTUNITIES

- Increase of production capacities
- ^{211}At -node for centralized production with close delivery
- IP development
- Better therapeutic index
- Scientific exchanges
- International collaboration
- COST NOAR & Expanding community of users
- **World Astatine Community**

- Half-life 7,2h
- 1 alpha particle emitted
- Cyclotron, $^{209}\text{Bi}(\alpha,2n)^{211}\text{At}$
- Scalable production
- Independence from unstable countries
- Cheap raw material
- Mastered Patented Chemistry (USA, Sweden, Japan & France)
- Preclinical & clinical applications
- Waste management is easy
- Increasing production centres in EU
- Increasing research centres
- Increasing Industrials involvement
- Increasing mass of users

World Astatine Community: USA, JAPAN, EUROPE,



....OPEN TO ANY NEW PARTNERS

Common expectations for the World Astatine Community

Goal:

- Enable the World Astatine Community to explore the full-potential of ^{211}At for therapy.

Objectives:

- Advance the science
- Partner to enable a global increase in production capacity & availability
- Motivate clinical interest & provide further clinical evidences

Deliverables:

- Support the World Astatine Community by:
 - making technological advancements globally available to researchers and industry.
 - demonstrating a supply chain network with adequate amount of production to cover multiple clinical trials.
 - encouraging collaborative international research.

World Astatine Community ambition

- For **academia**: **to have access to a global knowledge exchange network** that should favour innovation, capacity building and establishment of collaborations at international level.
- For **industry**: to have an **identify access to innovation** in preclinical and clinical research. This should facilitate rapid transfer of innovation from academia to industry.
- For **general practitioners, clinicians and specialists**: to get **more information** on innovative tools **for the benefit of the patients**.
- For **patients**: **to be better informed** on therapeutic advances.

THANK YOU

