



# The Power of Astatine-211: From the COST- NOAR Success Story to Clinical Reality

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## Objectives:

- Cyclotron, <sup>209</sup>Bi( $\alpha, n$ )<sup>211</sup>At
- Half-life 7,2h
- 1 alpha particle emitted
- Cheap raw material
- Scalable production
- Independence from unstable countries
- Mastered Patented Chemistry
- Ambulatory treatment
- Waste management is not an issue

**BUT ...**

- Lack of accessibility
- Half-life is too short for usual centralized production
- Lack of sufficient clinical POC
- There is a need for a critical mass of users

<sup>211</sup>At (7.214 h)  $\alpha$  41.8%  $E_\alpha = 5.9$  MeV  $\alpha$  58.2%  $E_\alpha = 76-92$  keV

$\alpha$  100%  $E_\alpha = 7.5$  MeV

<sup>207</sup>Bi (32.9 years)  $\alpha$  100%  $E_\alpha = 7.5$  MeV

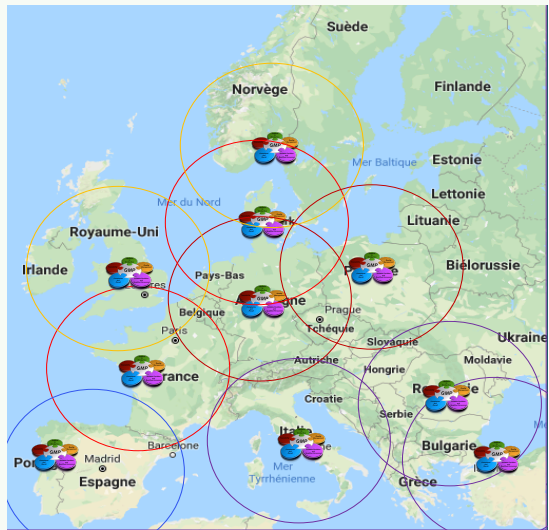
<sup>211</sup>Po (516 ms)  $\alpha$  100%  $E_\alpha = 7.5$  MeV

<sup>207</sup>Pb (stable)

Astatine-211 is emerging as a transformative and promising option in cancer therapy due to its unique properties. The COST Action Network on Optimized Astatine-Labeled Radiopharmaceuticals (NOAR) aimed to establish Astatine-211 as the gold standard for the treatment of certain types of cancer in Europe.

This initiative brought together leading European and International laboratories, manufacturing centers, hospitals, industries, and patient associations from over 22 countries in Europe, creating a comprehensive and innovative value chain that spans production, chemistry, radiochemistry, biology, preclinical and clinical research, and the delivery of radiopharmaceuticals to patients.

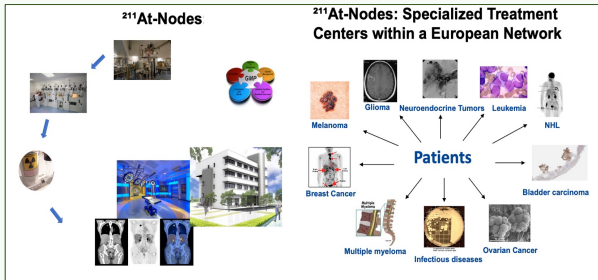
The goal of this project was to demonstrate that Astatine-211 used in targeted alpha therapy (TAT), could be established as the European standard for cancer treatment. Its alpha-emitting properties minimize damage to healthy tissue while maximizing therapeutic effects, offering a safer, more comfortable alternative for patients due to its short half-life of 7.2 hours, potential for outpatient treatment, and improved waste management.



Vision of the COST Action 19114: to build a European Network

## Methods:

The project involved the creation of a European network of dedicated Astatine-211 Treatment Nodes (ATNodes), integrating manufacturing, chemical processing, radiopharmaceutical synthesis, and clinical facilities with uniform quality standards.



Key objectives included enhancing collaboration and knowledge sharing between European and international stakeholders.

## Results:

## COST ACTIONS ADDRESSING PRESSING CHALLENGES

Annual Report 2024

### SUCCESS STORIES

#### ADVANCING CANCER TREATMENT THROUGH COST ACTIONS

Cancer is a major challenge in the modern world, affecting millions of people across Europe. The prevalence of this disease requires the development of innovative and complementary treatment approaches.

COST Actions are at the forefront of cancer research, driving innovation and progress in treatment. These actions, among many COST Actions dedicated to cancer research, include initiatives focusing on novel drug resistance mechanisms, advancing gene/protein/cancer awareness and research, and developing innovative diagnostic tools using nanotechnology. These and other collaborative efforts are contributing to the fight against cancer, providing hope and better outcomes for patients.

And the potential for outpatient treatment, and better waste management, astatine-211 represents a safe, more patient-friendly option for cancer therapy, explains Jean-François.

**The power of astatine-211**

Among the available treatments, astatine-211 is emerging as a game-changer in cancer therapy. By exploiting its unique properties, the COST Action Network for Optimized Astatine-Labeled Radiopharmaceuticals (NOAR) aims to establish it as the gold standard for treating certain cancers in Europe.

Astatine-211's unique properties make it an excellent option for treating several diseases such as blood, ovarian, and certain types of brain cancer. "One of the key advantages of Astatine-211 is its ability to precisely target cancer cells," says the Action Chair, Jean-François Gustin, of the ANR/CNRS group Accelerator for Research in Radiochemistry and Oncology at Nantes Atlantic, France. "Its alpha-emitting properties minimize damage to healthy tissue while maximizing the therapeutic effect. Because of its relatively short half-life of 7.2 hours,

NOAR has actively engaged with international scientific communities through congress presentations, symposia, and events like the Nuclear Medicine Europe conference. The Action has also collaborated with global partners, such as the US Department of Energy and the Japan Atomic Energy Commission. "Thanks to this partnership, we have decided to continue the work of COST NOAR by creating an association (NOAR Europe) that will organize the next edition of the workshop 'New Astatine-211' in Nantes, France," says Gustin. "These pages are a very welcome addition to the COST Action website and will help to raise the profile of NOAR as the European part of the new consortium!"

## Conclusions:

The COST NOAR action has facilitated efficient interdisciplinary, cross-sectoral, and international knowledge exchange, promoting collaboration between European and international stakeholders to advance the medical applications of Astatine-211.

The initiative has led to increased interest in production capacity, optimized transport conditions, advances in radiolabeling chemistry, and progress in the development of new radiopharmaceuticals. These results were presented during the COST NOAR Global meeting in Nantes, France (<https://astatine-net.eu/events/cost-third-global-meeting-from-1-to-3-october-2024-in-nantes/>).

European action within NMEU (<https://nuclearmedicineeurope.eu/>) associated to the strength of the NOAR community have led to 2 IHI grants, Thera4care (<https://www.ihf.europa.eu/projects-results/project-factsheets/thera4care>) and Accelerate.eu (<https://www.ihf.europa.eu/projects-results/project-factsheets/accelerateeu>) and the announcement of a partnership agreement between IBA and FRAMATOME (<https://www.framatome.com/medias/framatome-and-iba-to-partner-to-develop-an-astatine-211-cyclotron-network-in-europe-and-the-us/>) to build a <sup>211</sup>At pilot facility in Nantes area, France, first step for an European ATNodes network. This has led to increased interest from academics and industry and has reassured them of the accessibility of <sup>211</sup>At thanks to the establishment of various <sup>211</sup>At cyclotrons in Europe, Japan, South Korea, China and South Africa, and of the feasibility of targeted alpha therapy with <sup>211</sup>At in the very near future.

COST NOAR ended in October 2024, and NOAR EUrope took up mission in Europe, integrated within the World Astatine Community.