Actinium-225 for AlphaMet

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1. Authors

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2. Context of the project (800 characters max. including spaces)

The main objective of this project has been the provision of Ac-225 for the needs of the research project AlphaMet, which aims to address metrological challenges of the targeted alpha therapy in nuclear medicine across Europe. The provided material has been used to prepare standardized samples with known activity traceable to primary standards, which have been shipped to and between several European hospitals and preclinical centres in order to check their activity measurement capabilities of Ac-225, both on the side of personnel as well as the measuring equipment. This intercomparison campaign should help to identify and address measurement needs within the community as well as potential training needs for activity measurements of alpha emitters.

3. Results and discussion (1000 characters max. including spaces)

The requested radionuclide Ac-225 was provided in the form of Ra-225/Ac-225 generator, which allows for several separations of Ac-225 from a single generator. During the course of the project, three generators have been provided. The first generator was dispatched to SCK-CEN (Belgium), the remaining two went to CMI (Czechia). At these labs 9 extractions have been performed. Samples of Ac-225 were prepared for comparison of radionuclide calibrators (Schott vials), gamma counters (plastic tubes) and SPECT/CT cameras (cylindrical phantom) in hospitals and preclinical centres. Activity of all samples was metrologically traceable to primary standards. In order to maximize the use of available activity, samples sent to one participant continued to another participant, sometimes getting to as many as 6 participants in a row. The regions thus covered include Germany, Belgium, Netherlands, Czechia, Sweeden and Switzerland. The results of the comparison are currently being analysed.

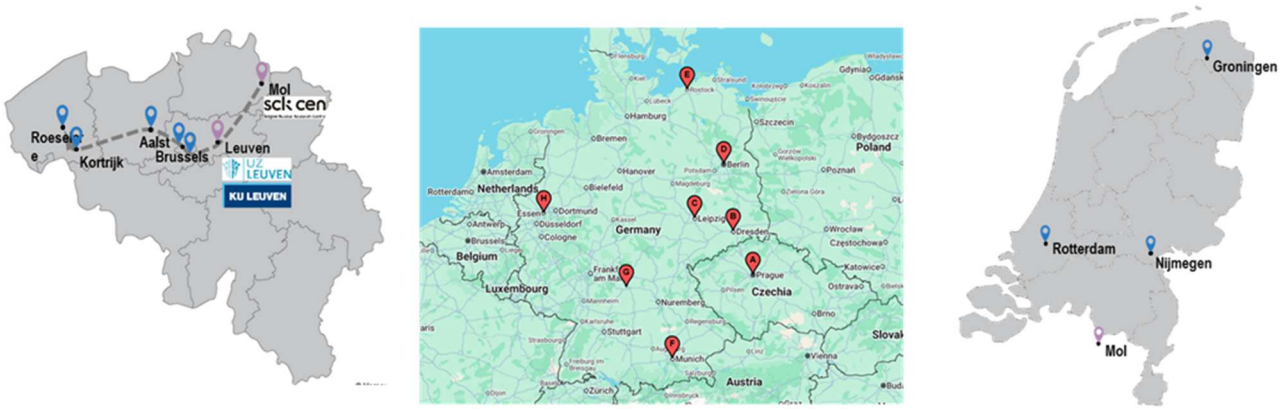

Figure 1. Participating hospitals and preclinical centres in Belgium, Germany, Czechia and Netherlands.

4. Conclusions (800 characters max. including spaces)

The PRISMAP collaboration provided three Ra-225/Ac-225 generators for the production of Ac-225 for the purpose of an intercomparison of activity measurement capabilities in European hospitals and preclinical centres organized within the European research project AlphaMet. More than 50 MBq and more than 30 samples of Ac-225 have been prepared, standardized and shipped to the intercomparison participants. The

results of this measuring campaign will help to identify and fill any possible gaps in the traceability chain for nuclear medicine centres performing the targeted alpha therapy, making thus significant step towards personalised dosimetry in nuclear medicine.

5. Involvement of the PRISMAP services (600 characters max. including spaces)

The requested radionuclide Ac-225 was provided by the PRISMAP's facility CERN MEDICIS in the form of Ra-225/Ac-225 generator, which allows for several separations of Ac-225 from a single generator. During the course of the project, three generators have been provided. The PRISMAP collaboration has been the only available and accessible source of Ac-225 for the AlphaMet project so far.

6. Feedback to PRISMAP (600 characters max. including spaces)

Due to technical issues at the MEDICIS facility the provided activity was significantly lower than requested. Even though a third batch was provided to mitigate the missing activity, only roughly 1/4 of needed activity of Ac-225 was extracted from the generators in total. In addition, the delivery date of the 2nd and 3rd batch was postponed several times, which made the coordination of the planned experiments extremely difficult (several metrology institutes and more than a dozen of European hospitals were conducting the measurements one after another, with the activity being shipped from one place to the next). Also, the measurements themself needed to be adapted to the lower activities (longer measuring times, different geometries, less SPECT/CT acquisitions, etc.).

7. Publications and other dissemination activities (conferences etc.)

A detailed report describing conditions and results of the intercomparison is being prepared and it is expected to be published at the beginning of 2026.

Appendix 1. Dissemination guidelines for user projects as agreed in the signed User Agreement

Dissemination rules

Only user groups that are allowed to disseminate the results which they have generated under the project may benefit from the access, unless they are working for SMEs.

For each user group project, a publishable project summary and a publishable summary of the results will be published on the European Union Horizon 2020 PRISMAP project website www.prismap.eu. The publication of results in journals or at conferences is strongly encouraged.

To ensure the long-term sustainability of the PRISMAP initiative, proper recognition of the contributing facilities, their services and the involved persons is necessary. All participating PRISMAP facilities shall be acknowledged in the publication. Acknowledgement and co-authorship of PRISMAP staff members who participated in the experiment shall be considered according to the research field best practices and verified with the PRISMAP Technical Manager before any publication.

The user group shall contact the PRISMAP Technical Manager 30 days prior to submission of publications or other communications of results that were obtained by making use of services provided by PRISMAP (radionuclides delivered or medical services provided). The Technical Manager will communicate to the user group the list of PRISMAP facilities and persons that have contributed to each specific project and the way this contribution must be acknowledged in the publication/communication or where co-authorship is required to reflect specific scientific contributions.

Users must comply with Horizon 2020 dissemination rules (i.e. acknowledge that their work was financially supported by the European Union's Horizon 2020 Research and Innovation Programme by including the following acknowledgement: "This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101008571 (PRISMAP)"), and grant open access to resulting publications and related data.

Dissemination shall take place only once legitimate interests regarding intellectual property have been safeguarded. A maximum publication delay of 90 days may be granted for this purpose.

Acknowledgements

The list of name(s) to be mentioned in the acknowledgment section is sent to the technical manager by the main contact of the involved facilities.

A general sentence will be added by the corresponding author of the article (user side):

"The authors would like to thank the members of the PRISMAP consortium and of the PRISMAP user selection panel, coordination and management team for their advice and support."

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