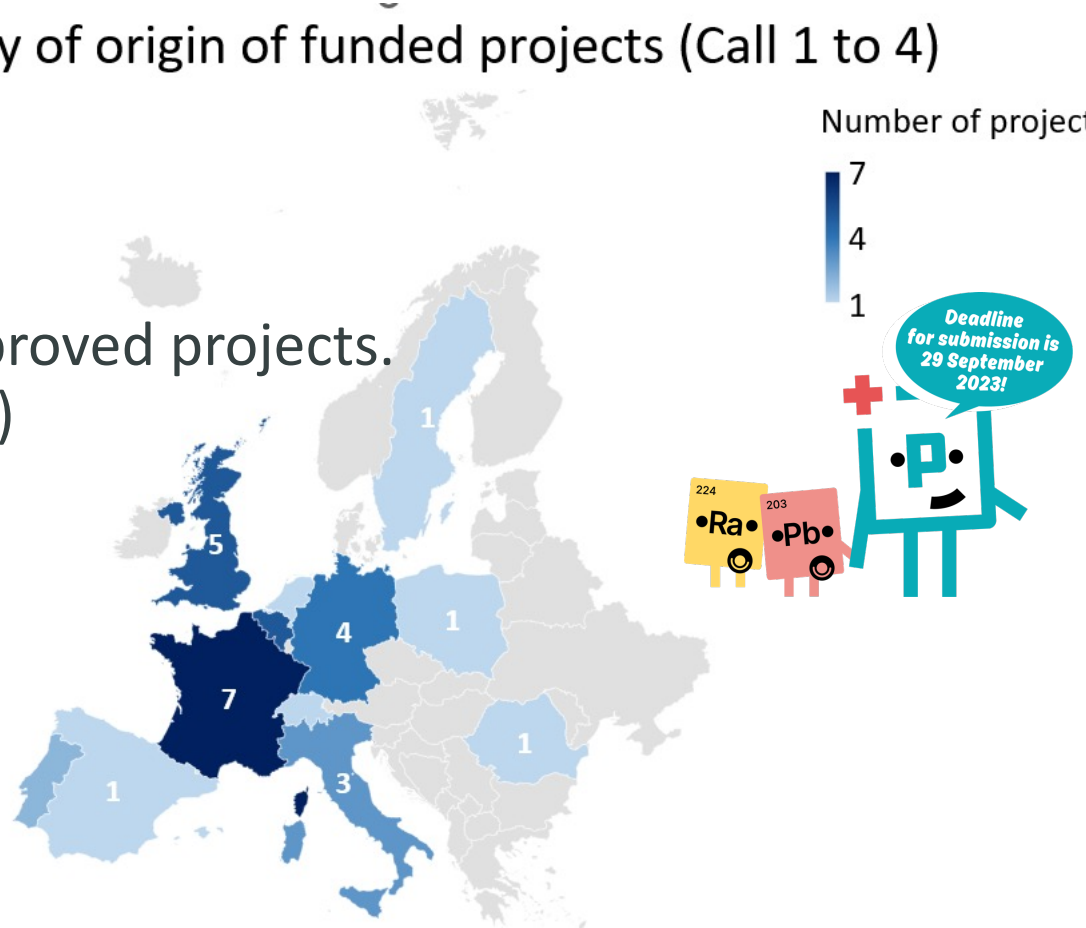
NEWS FROM PRISMAP

Thomas Elias Cocolios (KULeuven)

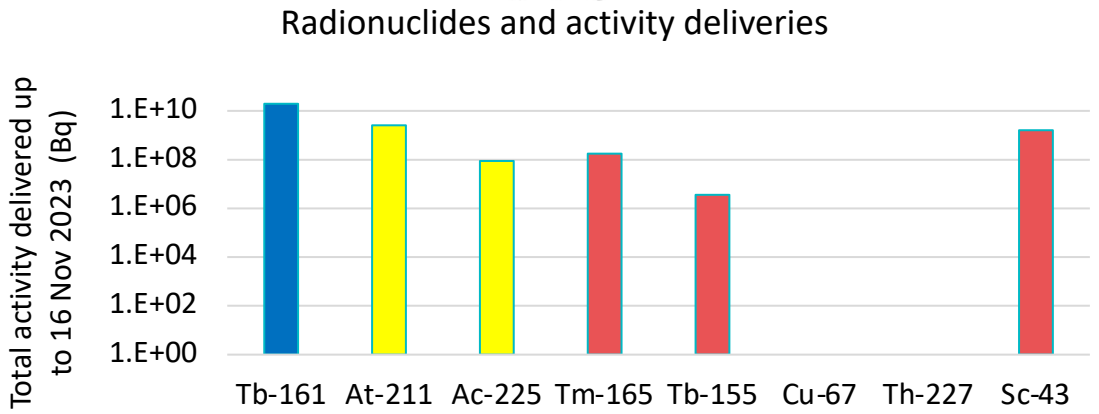
PRISMAP CM6 – Lisbon – 28 Nov 2023

PRISMAP at call 4

- The call 4 selection is just completed, with 17 approved projects. We now have 32 approved projects (1 completed)
- User agreement process is now streamlined. Deliveries are ongoing.
- First publication from a user project accepted!



https://www.prismap.eu/access/user-projects/



Recent developments from PRISMAP

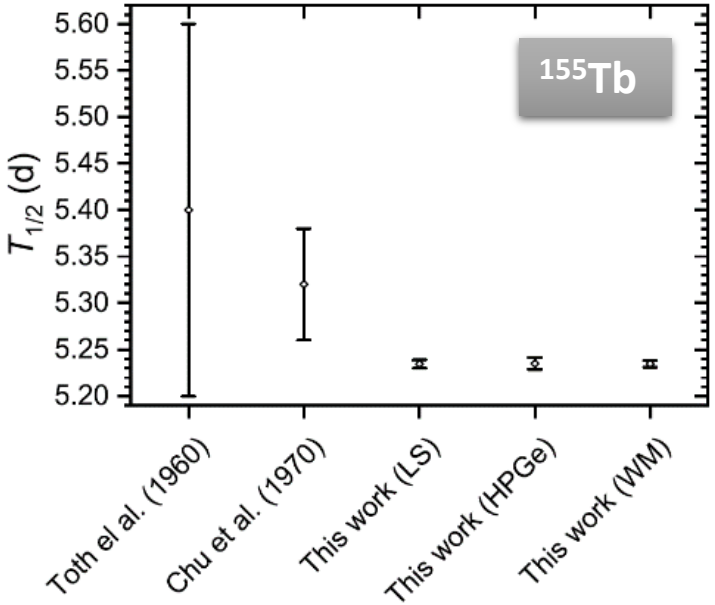
- Nuclear data for day-1 radionuclides
- MOOC “At the heart of European medical radioactivity”
- Compliant and efficient transportation of radionuclides
- Progress on Ca/Ti enrichment studies

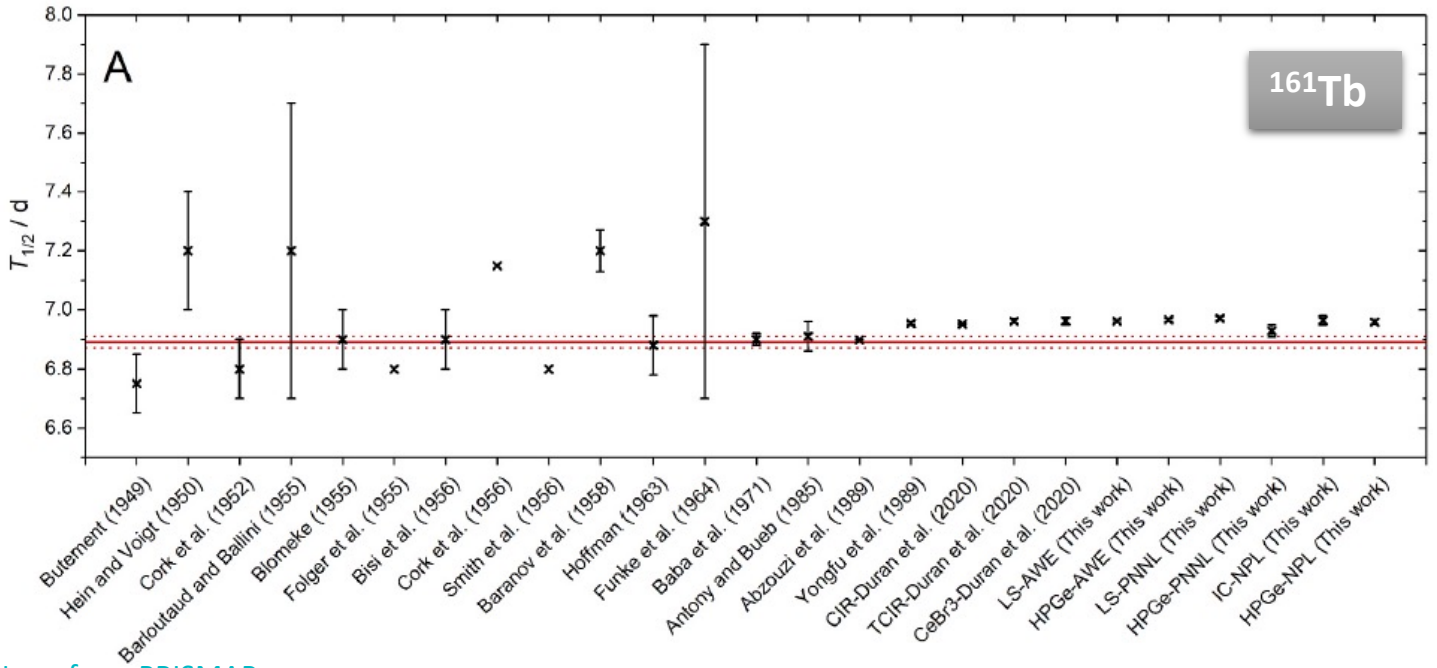
All our outcomes can be found on the PRISMAP website: https://www.prismap.eu/about/outcomes/

Includes our public deliverables, papers, public summary, …

Progress on decay data

- Standardization of our novel radionuclides via partner metrology institutes.
- Identification of needed actions.





Many isotopes are under our radar:

- BIPM Comparison submission for ^{161}Tb and ^{203}Pb
- Standardization of the Tb quadruplet – including plans for on-site work with ^{149}Tb
- ^{167}Tm
- ^{225}Ac standardization and radiobiology investigation

D11.1: Nuclear Decay Data for Day-1 radionuclides

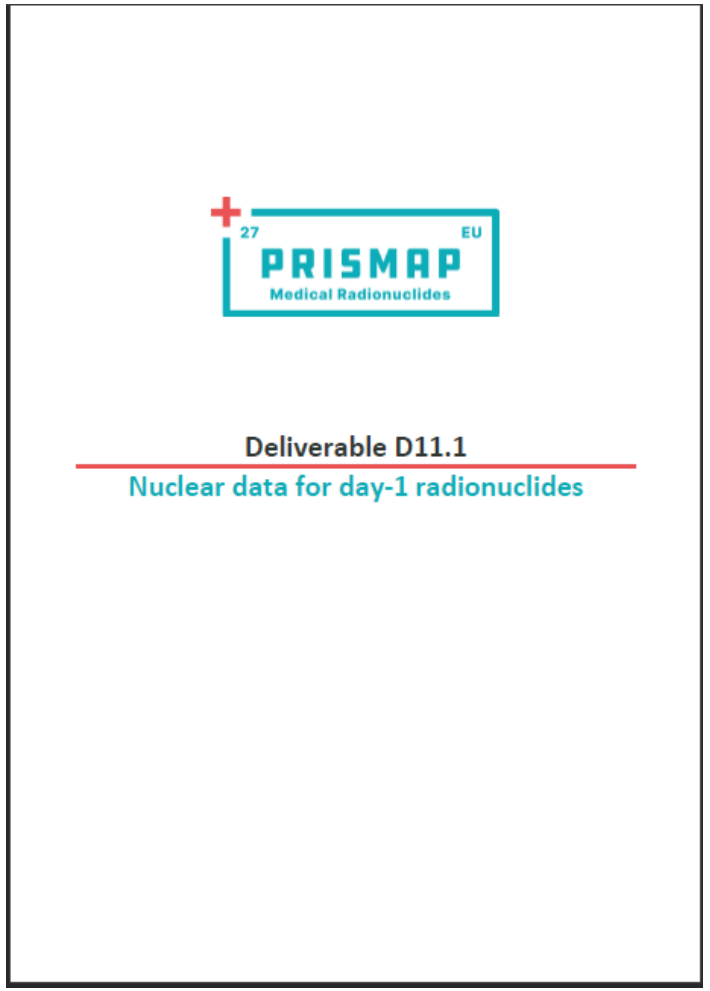


Table 1. PRISMAP day-1 radionuclides.

Radionuclide	Application	Imaging(I)/ Treatment(T)/ Generator(G)	Production reaction
Sc-44/Sc-44m	PET	I	^{44}Ca(p,n); ^{44}Ca(d,2n)
Sc-47	β⁻ therapy, SPECT	I/T	^{46}Ca(n,γ)^{47}Ca(β⁻)
Cu-64	PET	I	^{64}Ni(p,n); ^{64}Ni(d,2n)
Cu-67	β⁻ therapy, SPECT	I/T	^{68}Zn(p,2p); ^{70}Zn(p,α)
Ag-111	β⁻ therapy, SPECT, TDPAC	I/T	^{110}Pd(n,γ)^{111}Pd((β⁻); ^{110}Pd(d,n)
La-135	Auger therapy	T	^{nat}Ba(p,X)
Tb-149	α therapy, PET	I/T	^{nat}Ta(p,spall)
Tb-152	PET	I	^{nat}Ta(p,spall)
Tb-155	Auger therapy, SPECT	I	^{nat}Ta(p,spall)
Tb-161	β⁻ therapy, SPECT	I/T	^{160}Gd(n, γ)
Dy-166	Generator for Ho-166 (β⁻ therapy, SPECT)	G	^{164}Dy(n, γ)(n, γ)
Er-165	Auger emitter	T	^{165}Ho(n, γ)
Tm-165	Generator for Er-165 (Auger therapy)	G	^{nat}Ta(p,spall)
Er-169	β⁻ therapy	T	^{168}Er(n, γ)
Yb-175	β⁻ therapy, (SPECT)	T	^{174}Yb(n, γ)
Pt-195m	Auger therapy, SPECT	I/T	^{194}Pt(n, γ)
Bi-213	α therapy	T	^{225}Ac generator
At-211	α therapy	T	^{209}Bi(α,2n)
Ac-225	α therapy	T	^{229}Th generator; ^{232}Th(p,spall)

https://zenodo.org/records/8247129

Slide courtesy of Seán Collins

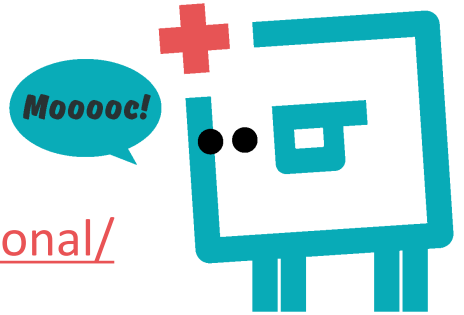
D11.1: Nuclear Decay Data for Day-1 radionuclides

Table 20. Summary of nuclear decay data needs for the PRISMAP day-1 radionuclides.

Radionuclide	Recommendations for future studies
Sc-44	▪ New studies of the decay branching ratio of the ε/β^+ decay routes. ▪ Further studies of the half-life may be beneficial to improve the current evaluation dataset.
Sc-47	▪ Absolute gamma-ray emission intensity studies of the 159.381 keV would be of interest to revisit to resolve a bias between values determined from different measurement systems.
Cu-64	▪ Further studies of the decay branching ratio of the β^- decay route is worthy of further scrutiny.
Cu-67	▪ New studies of the half-life would be beneficial to confirm the accuracy of the half-life and to improve the precision. ▪ A new decay data evaluation is required.
Ag-111	▪ A new decay data evaluation is required.
La-135	▪ Further studies of the half-life are needed. ▪ Additional γ-γ coincidence studies would be of use to complete the placement of the gamma transitions in the decay scheme. ▪ Absolute gamma-ray emission intensity studies derived from an absolute standard are needed to improve the precision of these values. ▪ Requirements for improved X-ray and Auger-electron data studies.
Tb-149	▪ Precision measurements of the half-lives of Tb-149 and its decay progenies (Eu-145 and Gd-149) are needed. ▪ New studies are required to improve the precision of the alpha decay branching ratio. ▪ There is a requirement for new studies of the gamma-ray emission intensities to confirm the accuracy of the single study and to improve the precision. ▪ There is also a requirement to improve the gamma-ray emission intensities of the decay progenies.
Tb-152	▪ New γ-γ coincidence and TAGS studies are needed to complete the decay scheme and to confirm the highest energy transition states. ▪ New half-life measurements are needed to confirm the accuracy of two studies in the 1960s and to improve the precision. ▪ Absolute gamma-ray emission intensity measurements are needed.
Tb-155	▪ Further γ-γ coincidence measurements are needed to resolve the placement of 40 gamma transitions. ▪ Absolute gamma-ray emission intensities are required to improve the electron capture branching ratios. ▪ Further studies of the half-life are warranted to expand the evaluation dataset.
Tb-161	▪ Further studies are required of the gamma-ray emission intensities, especially the 25.65 keV gamma ray to improve the beta branching ratio values to the ground state. ▪ A new evaluation of the half-life is required. ▪ There are requirements for further X-ray and internal conversion electron data. ▪ Studies of the Auger-electron emission data is required.
Ho-166	▪ A new evaluation is required to account for new data.
Er-165	▪ Direct measurement of the Auger-electron energies and intensities are required.
	▪ A modern measurement of the half-life would be desirable to confirm measurements made in the 1950s and 1960s.
Er-169	▪ More detailed K X-ray and internal conversion data for the direct population of the 8.41 keV state and the transition to the ground state are recommended. ▪ Further studies of the half-life are recommended.
Yb-175	▪ Further studies of the half-life are desirable to increase the evaluation dataset.
Pt-195m	▪ Definite requirement for absolute gamma-ray emission intensities to improve the precision and confirm the accuracy. ▪ Further data for the internal conversion electron probabilities would be of benefit. ▪ New studies of the half-life using high-purity samples would be beneficial. ▪ Direct measurement of the Auger-electron energies and intensities are required.
At-211	▪ New half-life determinations with complete uncertainty evaluation are required.
Bi-213	▪ No recommendations.
Ac-225	▪ Extensive gamma-ray emission intensity studies and γ-γ coincidence studies are recommended are required.

Slide courtesy of Seán Collins

Training news & opportunities



https://www.prismap.eu/radionuclides/educational/

- **MOOC** “At the heart of European medical radioactivity” is now fully open and accessible.

- School on **radionuclide production**, Leuven (Belgium), 27-31 May 2024
  Mix of lectures, hands on work with ion sources and separators, poster presentations, and an industrial fair.

- School on **targeted alpha therapy**, ISI-NucMed, Nantes (France), 1-4 July 2024
  https://isinucmed.univ-nantes.fr/

- School on **medical imaging**, Riga (Latvia), Autumn 2024
  Together with the Baltic Congress of Radiology on 17-19 October 2024

Transport highlight: door to door in 4.25 h

- Transporting ^{165}Tm from CERN to DTU
  $T_{1/2}$=1.25 day
- Expected departure: Friday morning
- Classic transport: held at CDG until next flight Monday morning.
  Projected delivery time: 3.2 days ➔ 83% loss
- Charter flight: car-flight-car, delivered on Friday before end of day, in 4.25 hours.
- Price x5, for time /17.

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PRISMAP

Medical Radionuclides

KEEP POSTED ON OUR UPDATES THROUGH OUR USER FORUM

https://www.prismap.eu/radionuclides/user-forum/

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PRISMAP PROJECT

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