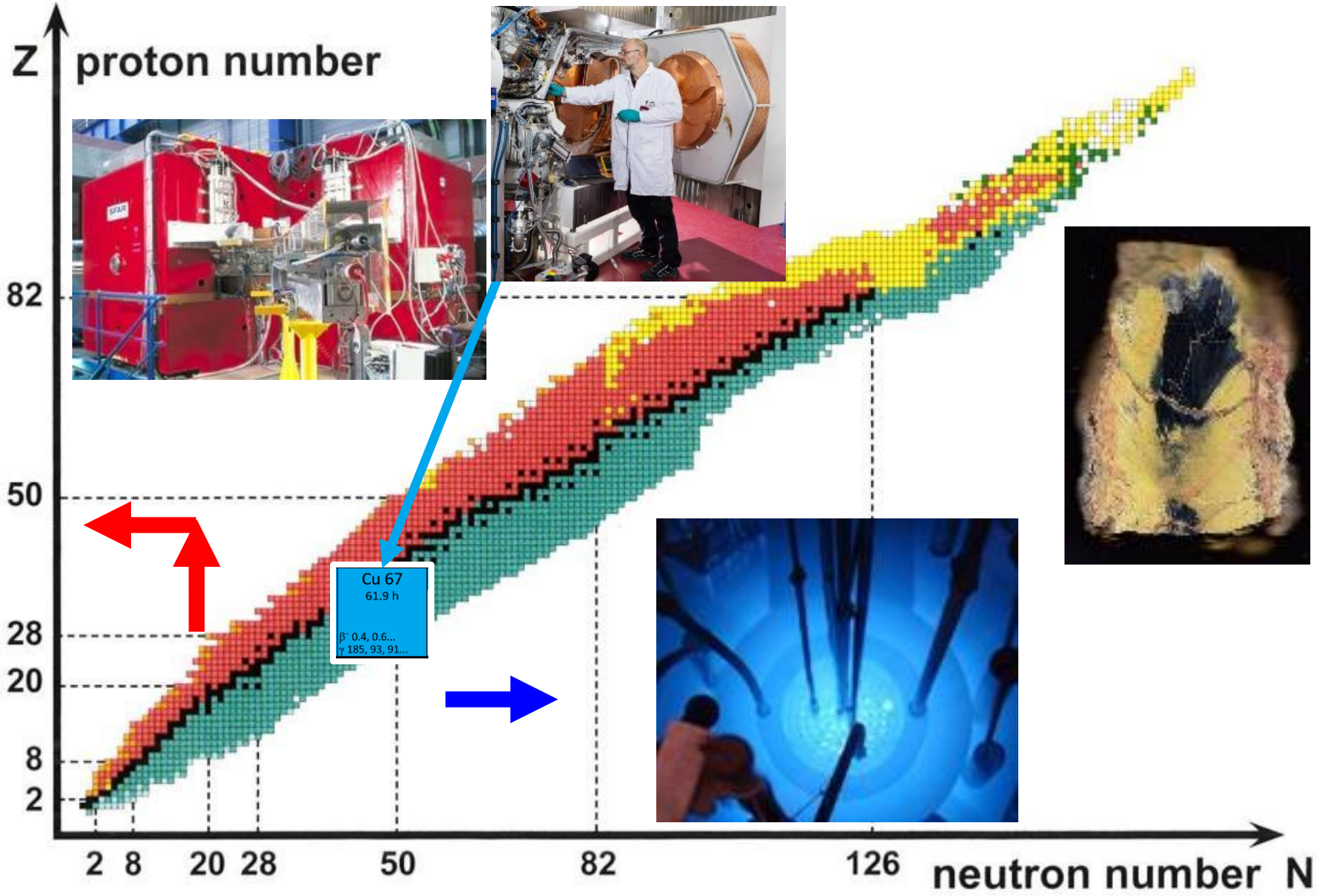
PRISMAP SERVICES FOR RADIONUCLIDE PRODUCTION AND THEIR BIOMEDICAL APPLICATION

PRISMAP Collaboration Meeting 9

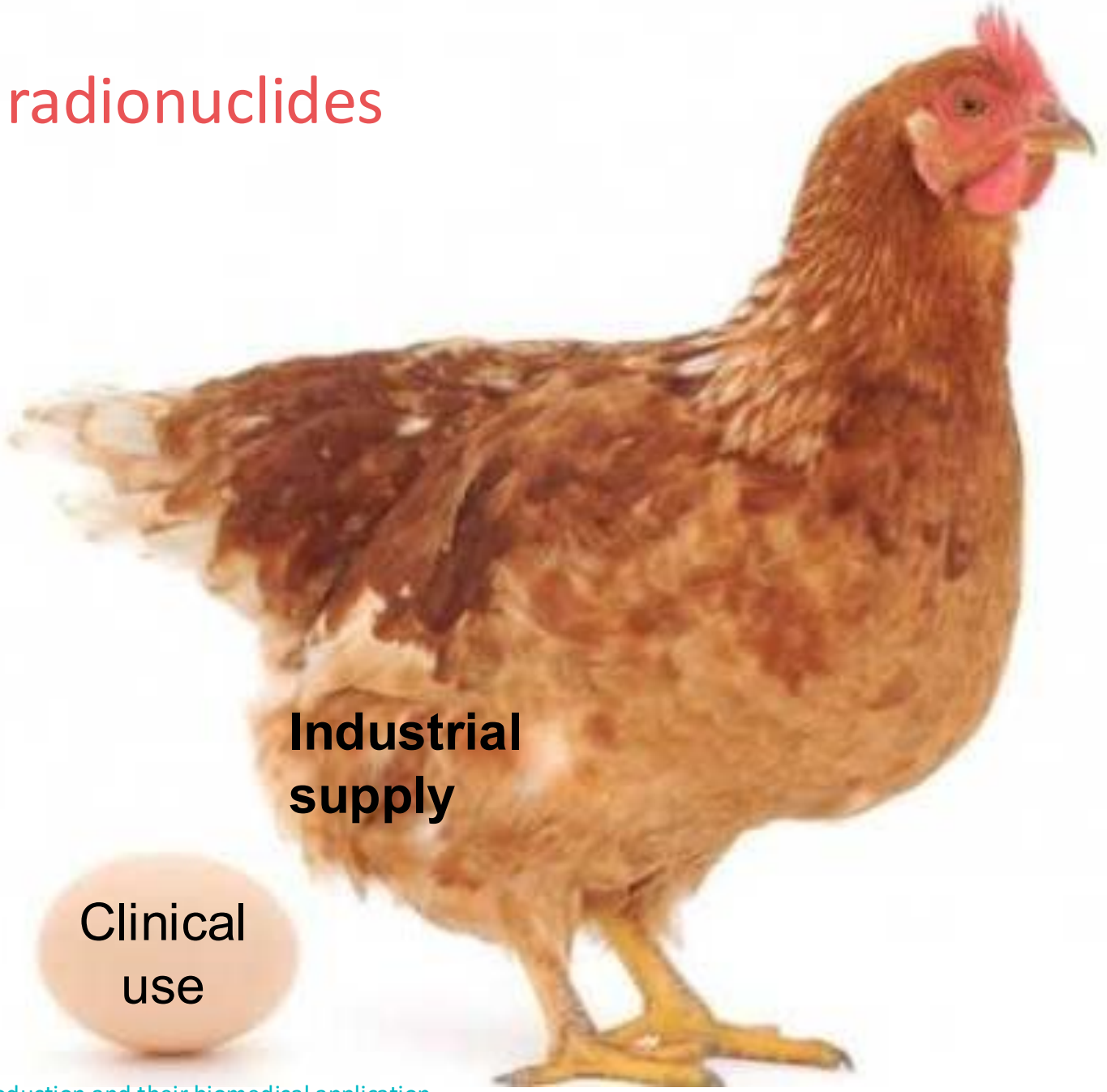
Ulli Köster, ILL Grenoble

The PRISMAP radionuclide portfolio (grown by user demands)

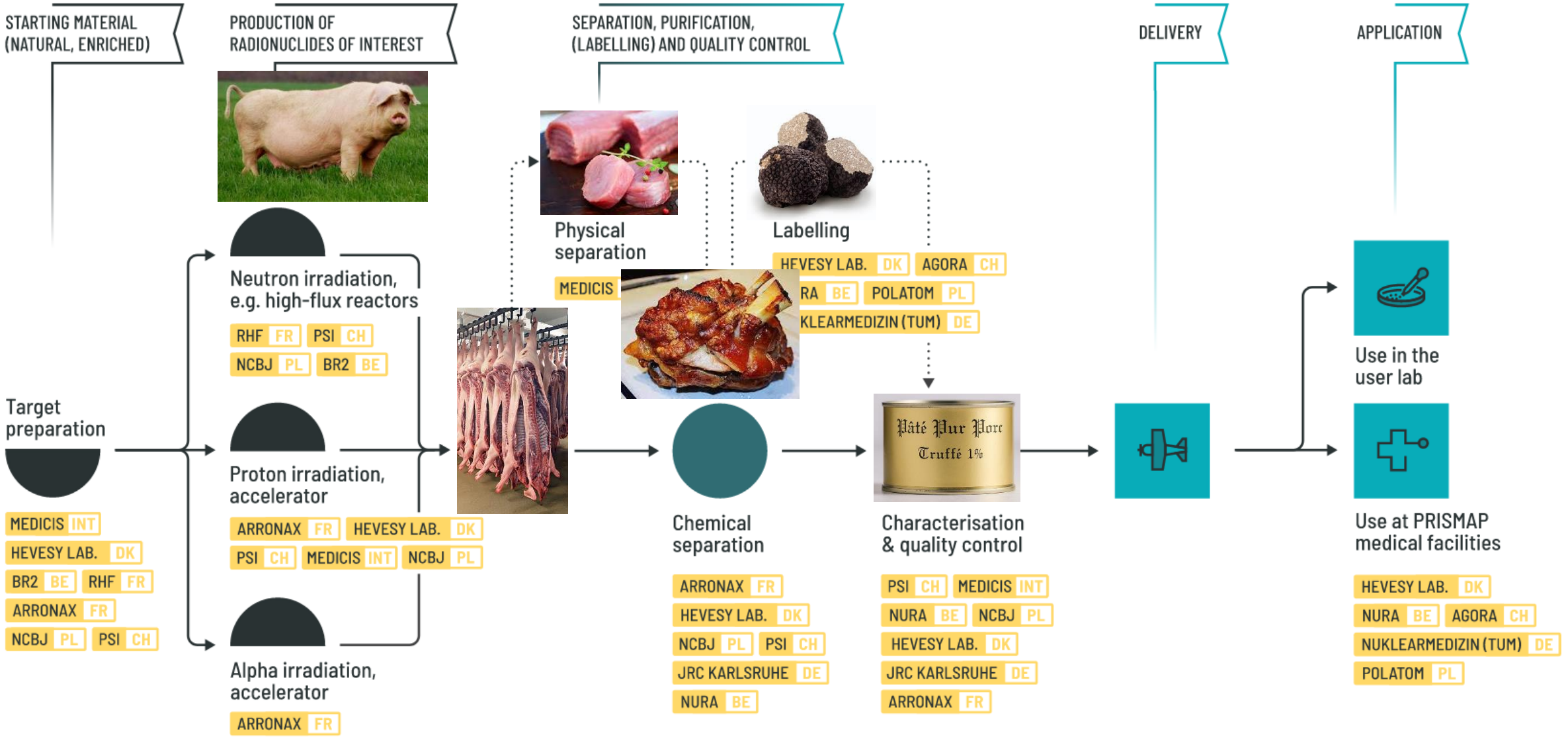
The “water divide” of radionuclide production



Introducing novel radionuclides



The flowchart of PRISMAP facilities



The PRISMAP Biomedical Facilities

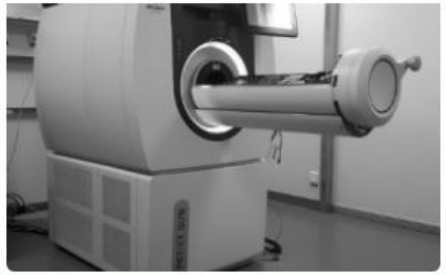
Hevesy Laboratory

Danmarks Tekniske Universitet – DTU

Radiochemistry
Nuclear spectrosc.
Cell cultures
μSPECT/CT

AGORA

Centre hospitalier universitaire vaudois — CHUV



μPET/μSPECT/CT
MRI
Translational
Clinical scanners

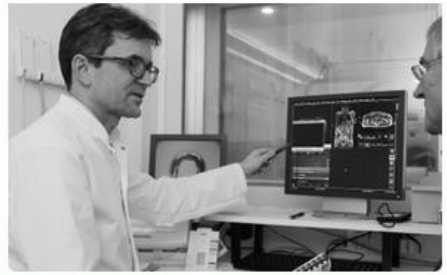
NURA

Studiecentrum voor Kernenergie / Centre d'étude de l'énergie nucleaire — SCK CEN

Cell cultures
μSPECT/CT
Longitudinal trials

Nuklearmedizin

Klinikum rechts der Isar der Technischen Universität München — TUM



μPET/MRI
μSPECT/CT
GMP Radiopharm.
Clinical scanners

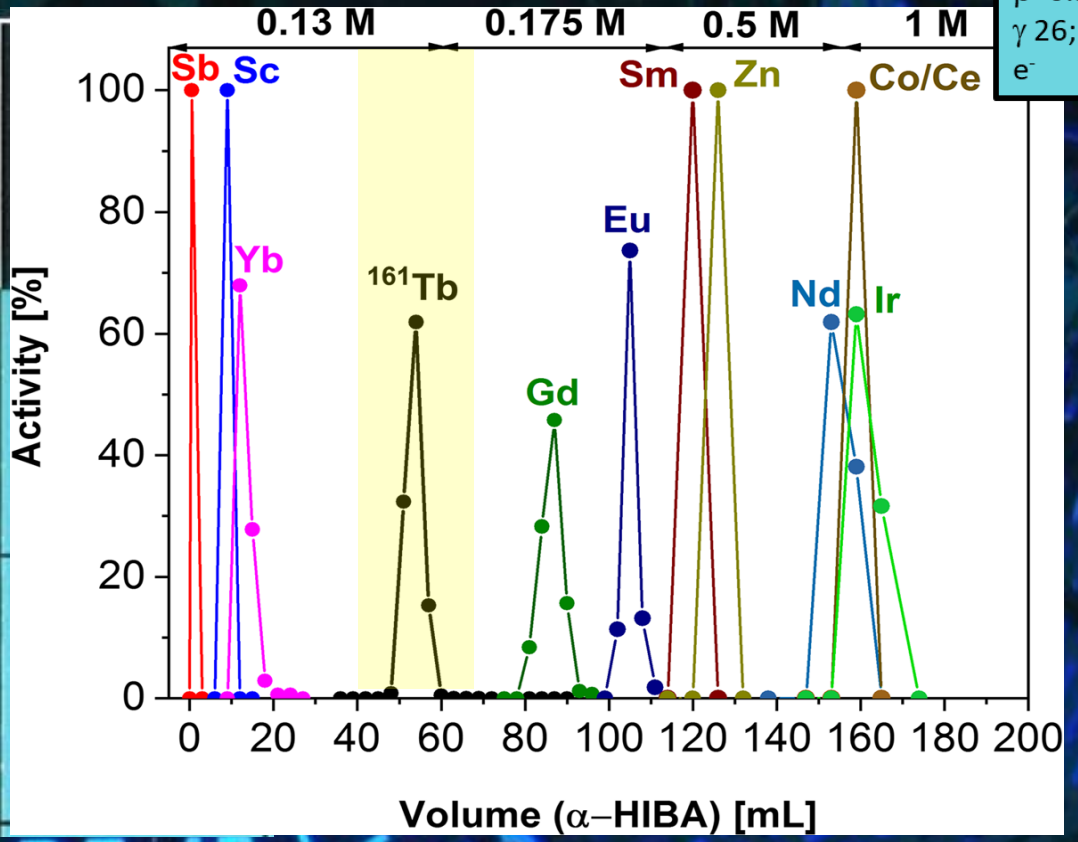
POLATOM

Narodowe Centrum Badań Jądrowych – NCBJ

Radiochemistry
Cell cultures
Optical imag. (Ch.)
GMP Radiopharm.

Production of non-carrier-added Tb-161

Dy 160 2.329 σ 60 $\sigma_{n,\alpha}$ <0.0003	Dy 161 18.889 σ 600 $\sigma_{n,\alpha}$ <1E-6	Dy 162 25.475 σ 170	Dy 163 24.896 σ 120 $\sigma_{n,\alpha}$ <2E-5
Tb 159 100 σ 23.2	Tb 160 72.3 d β⁻ 0.6; 1.7.... γ 879; 299; 966... σ 570	Tb 161 6.90 d β⁻ 0.5; 0 γ 26; 49; e⁻	Tb 162 7.76 m β⁻ 1.4; 2.4... γ 260; 808; 888...
Gd 158 24.84 σ 2.3	Gd 159 18.48 h β⁻ 1.0... γ 364; 58...	Gd 160 21.86 σ 1.5	Gd 161 3.66 m β⁻ 1.6; 1.7.... γ 361; 315; 102... σ 20000



Tb 161
6.96 d
β⁻ 0.5; 0.6
γ 26; 49; 75...
e⁻

Tb-161: ≈30% of PRISMAP deliveries

1 Tb-161 atom in ~10^4 Gd atoms

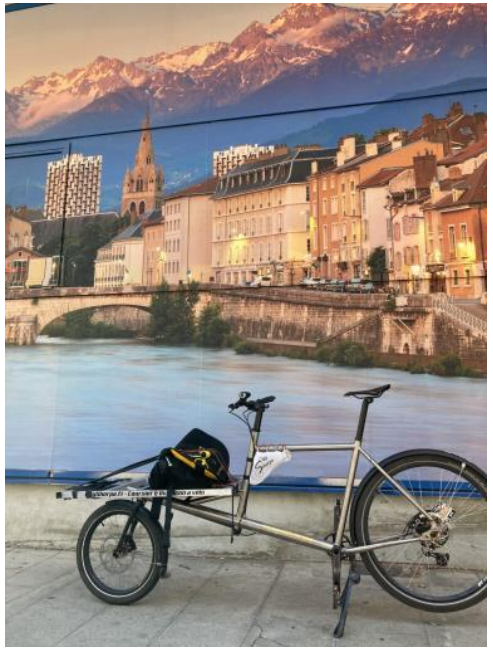
Irradiation in high flux reactor, then radiochemical separation

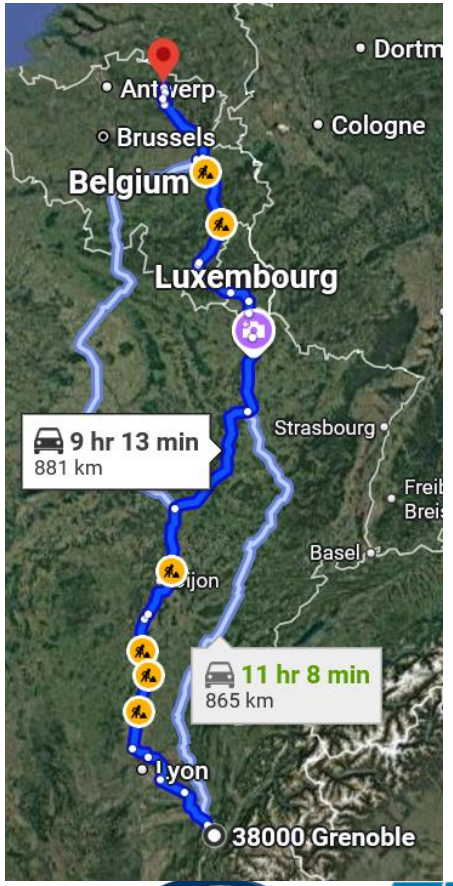
N. Gracheva et al., EJNMMI Radiopharm Chem 2019;4:12.

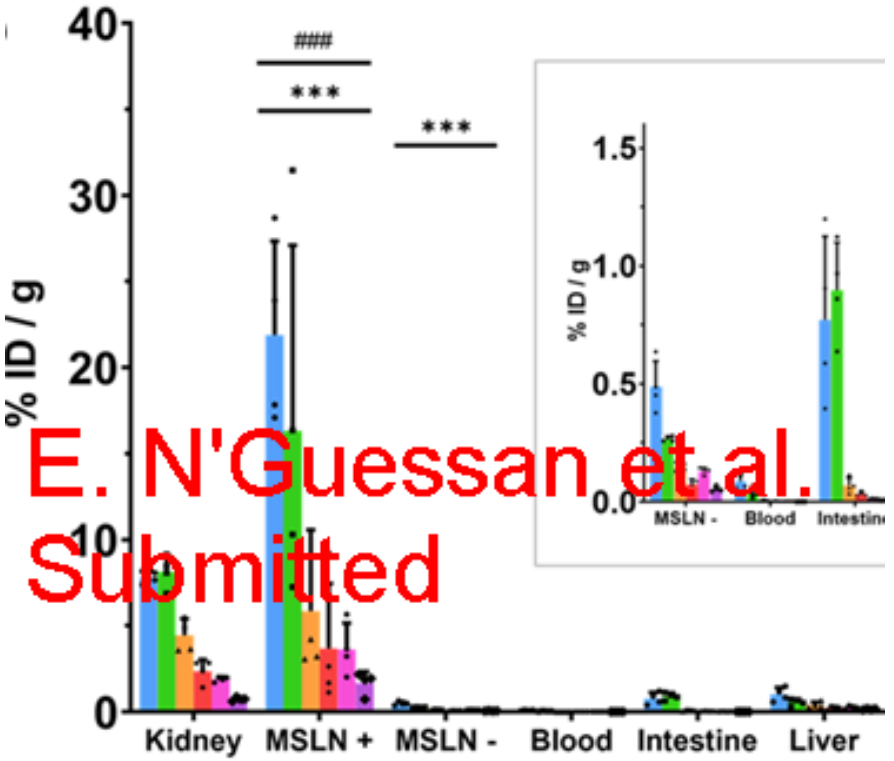
Local production versus centralized production

Tb 161
6.96 d
β^- 0.5; 0.6
γ 26; 49; 75…
e^-

Project P14 = INCA_16111 project, Alexis Broisat et al.
Development and preclinical evaluation of a mesothelin-targeting theranostic agent



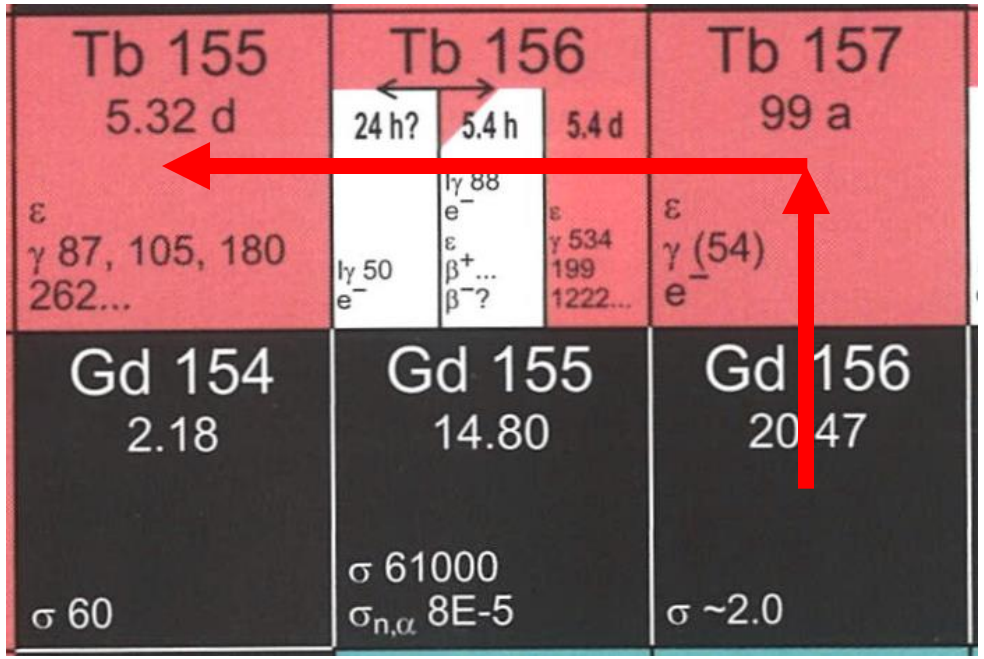


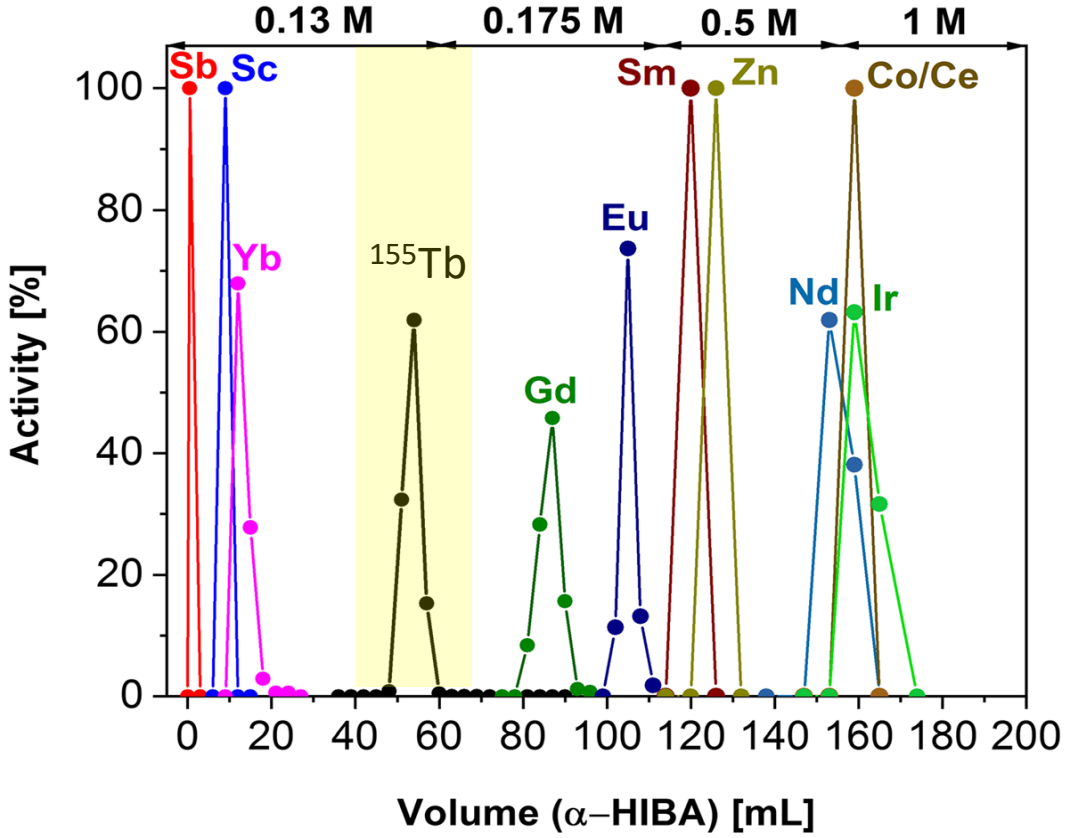


E. N'Guessan et al.
Submitted

Centralized production favorable for long-lived radionuclides !

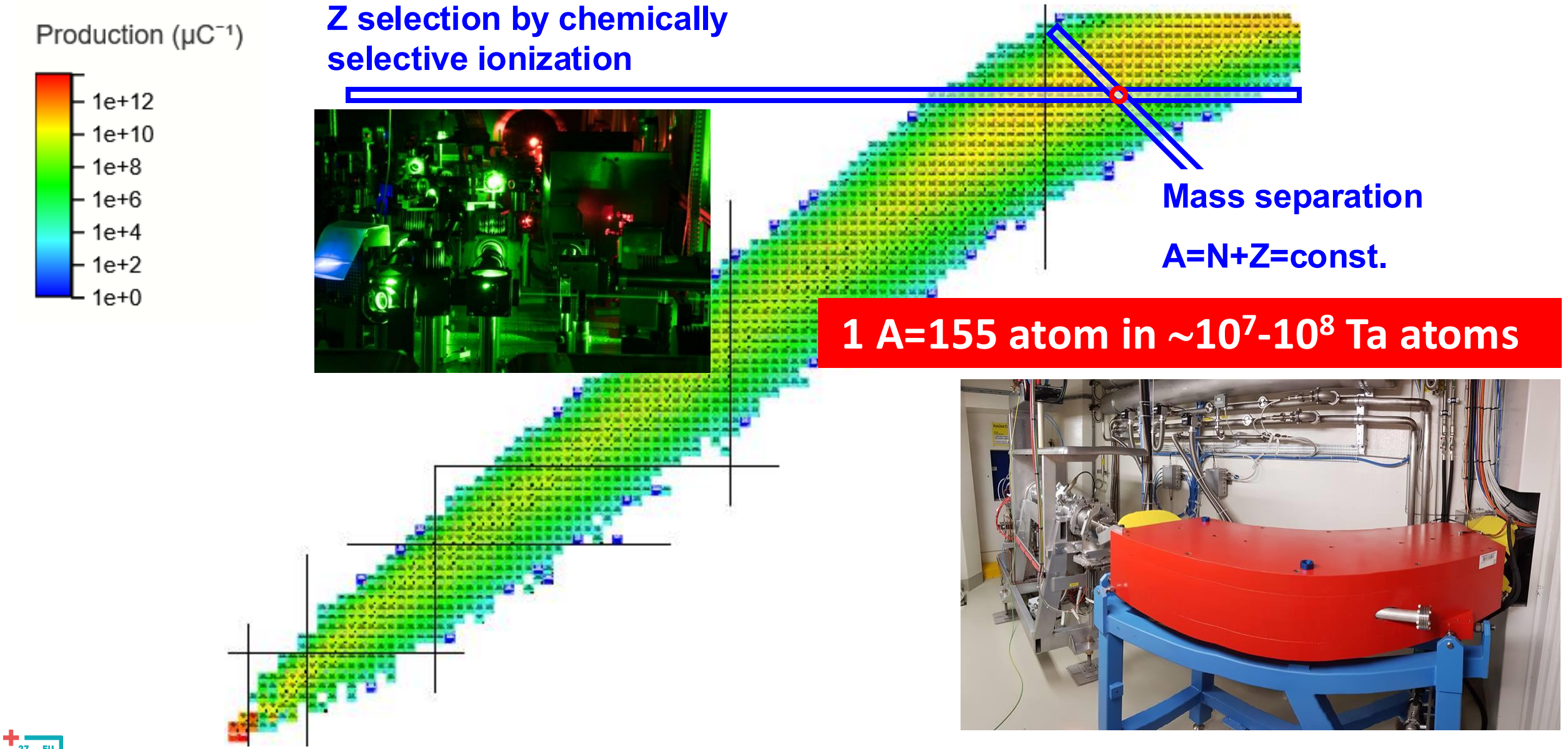
Production of non-carrier-added Tb-155 at PSI



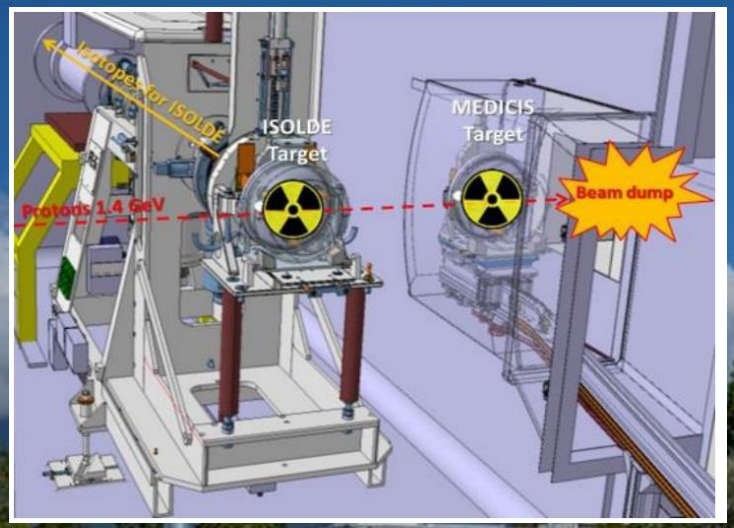


1 Tb-161 atom in ~10^5-10^6 Gd atoms

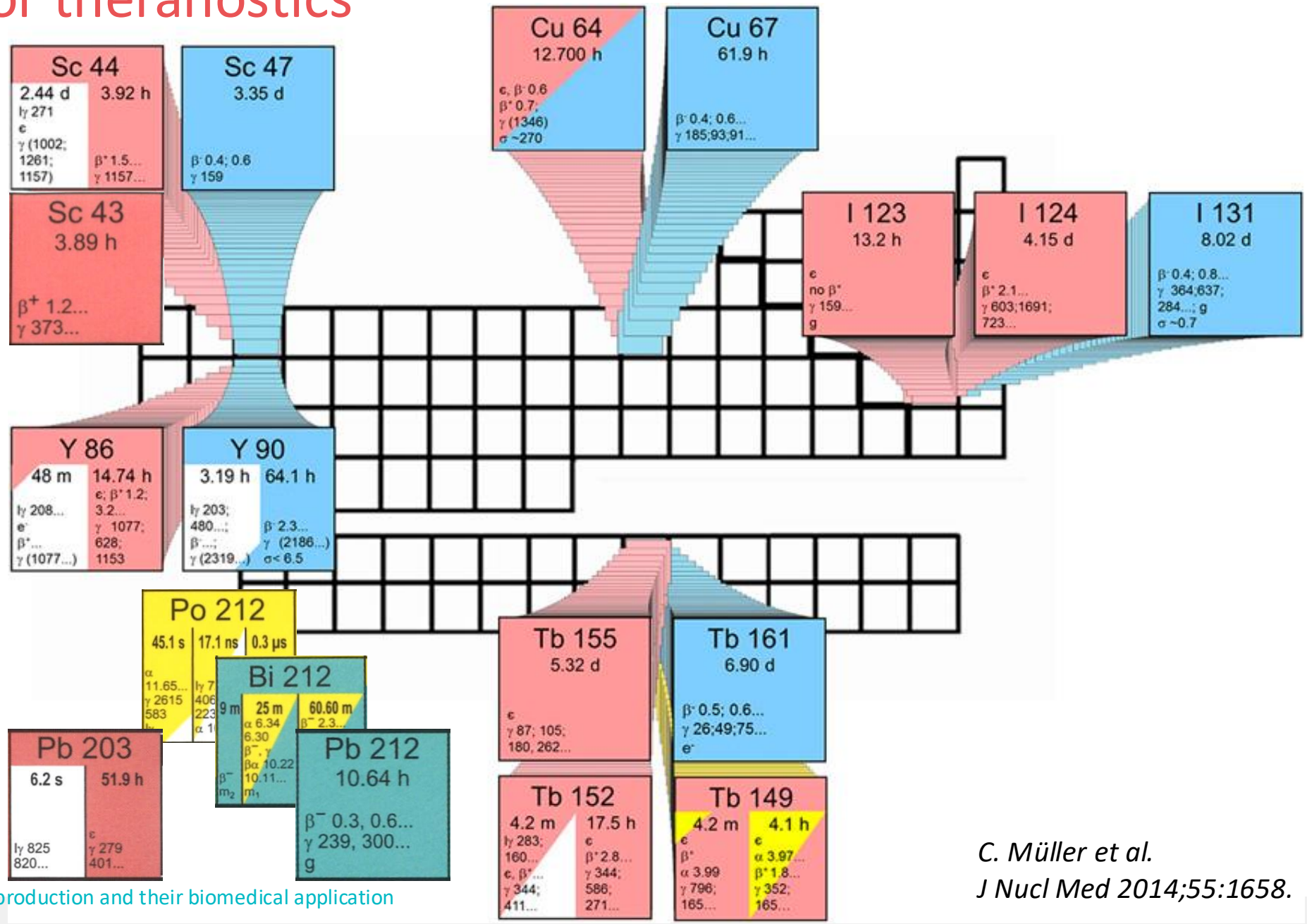
Production of non-carrier-added Tb-155 at CERN



A very useful beam dump

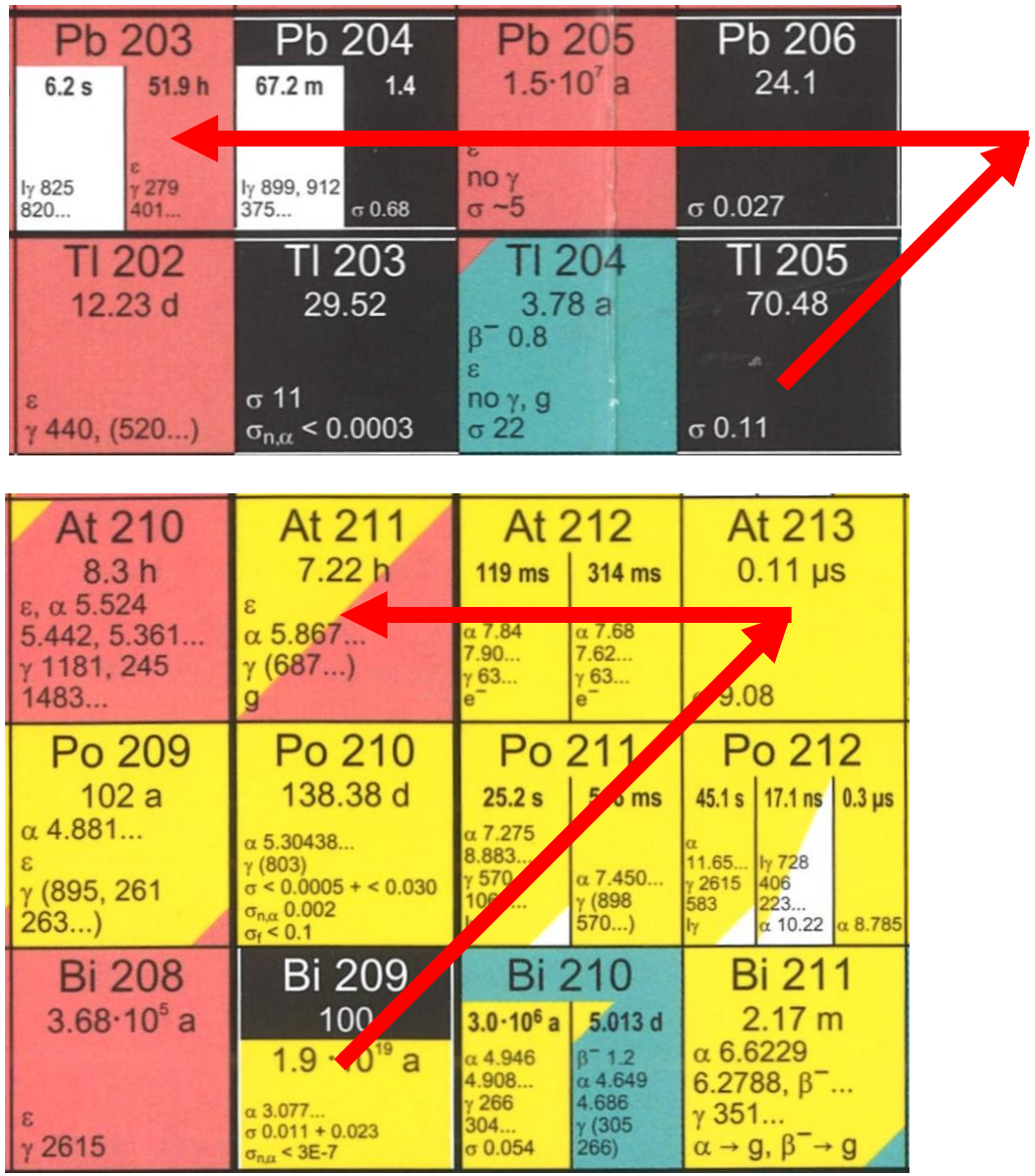


Matched pairs for theranostics

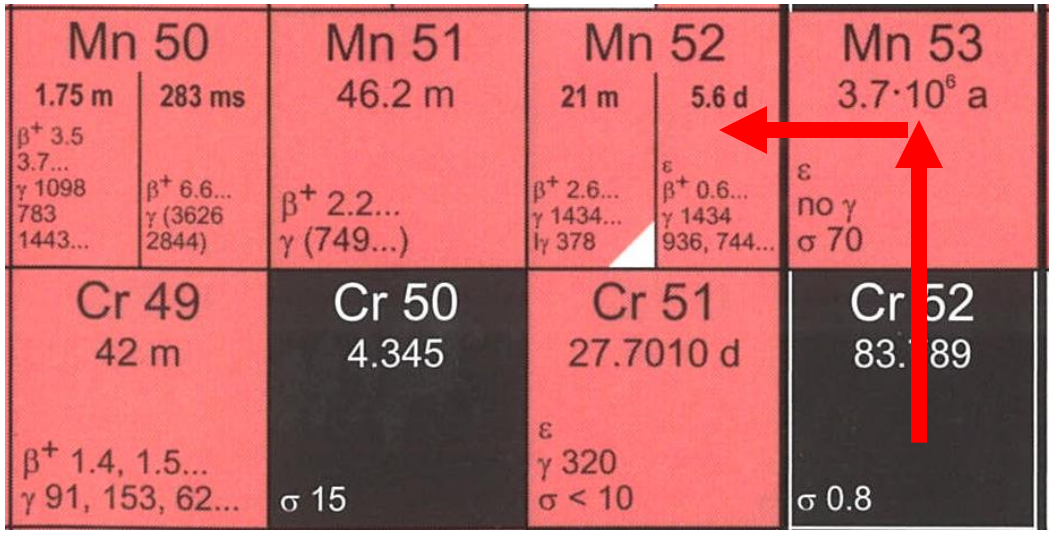


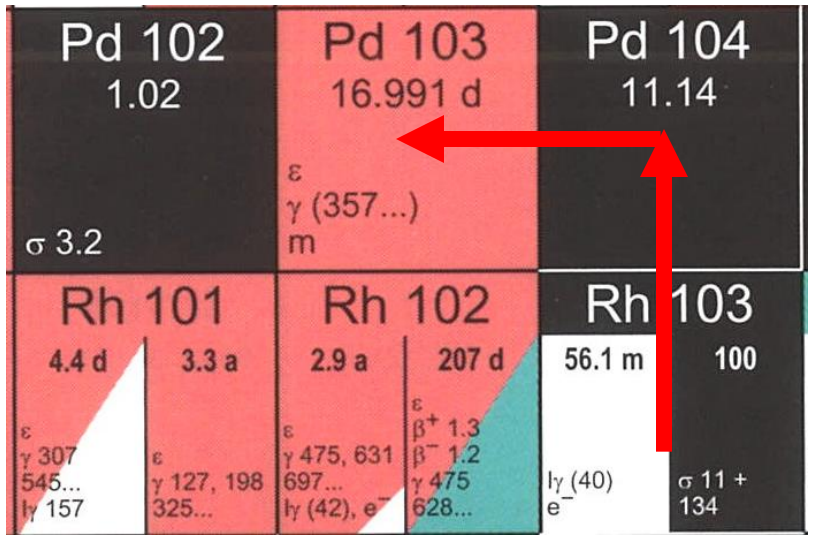
C. Müller et al.
J Nucl Med 2014;55:1658.

Production of non-carrier-added Pb-203 and At-211 at ARRONAX



Production of non-carrier-added Mn-52 and Pd-103 at DTU





The PRISMAP radionuclide portfolio (grown by user demands)

27 EU

PRISMAP

Medical Radionuclides

FOLLOW MARIA SALOMEA'S FOOTSTEPS !

WWW.PRISMAP.EU

PRISMAP PROJECT

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101008571 (PRISMAP).