



# Get to know our Zirconium-89.

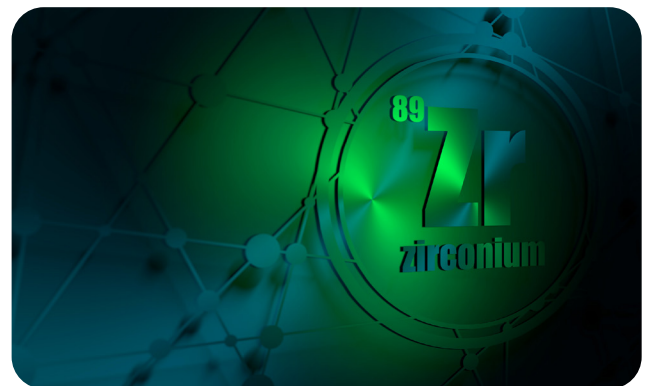
## Visualize and quantify uptake of monoclonal antibodies (mAb) with Zirconium-89\* ( $^{89}\text{Zr}$ ) radionuclide

A positron-emitting radionuclide,  $^{89}\text{Zr}$  has a half-life of 3.3 days, much longer than other elemental positron-emitting radionuclides such as Fluorine-18, Carbon-11, and Oxygen-15 which are used in molecular imaging applications. The half-life of  $^{89}\text{Zr}$  matches the biological half-life of a mAb making a labeled mAb an ideal biomarker for nuclear imaging such as PET applications which can be used to access target expression as well as imaging tumors (immuno-PET).

PET imaging using  $^{89}\text{Zr}$  is an attractive modality for research institutes, research hospitals and pharmaceutical companies interested in the development of protein-based imaging in animal models or *in vitro* studies.

For research and investigational use only.

\*Available in Europe and Asia only



## Features and benefits of $^{89}\text{Zr}$

- Long half-life - ideal biomarker label for nuclear imaging applications including Immuno-PET
- High purity - low levels of contaminants
- Available weekly - reliable production schedule
- Manufactured under GMP Directive 2003/94/EC - assurance of consistent product quality
- Unique NENSure™ product packaging - safe, secure, and maximizes recovery of material while ensuring minimal personal exposure

Zirconium-89 ( <sup>89</sup> Zr) specifications	
Availability:	Weekly
Catalog Number and Calibration:	NEZ308 Monday calibration in Europe and Asia NEZ308C Thursday calibration in Europe
Half Life:	78.4 hrs
Decay Mode:	β+, 395.5 keV
Chemical Form:	Zirconium-89 in 1M Oxalic Acid
Nuclear reaction:	Proton irradiation of natural Yttrium-89
Specific Activity:	No Carrier Added
Radionuclidic Purity:	> 99.9%*
pH:	< 4
Endotoxins:	< 17.5 EU/mL
Packaging:	NENSure vial
Shipping:	Ambient



Figure 1: NENSure packaging

\*At reference time

Manufactured by BV Cyclotron VU, Amsterdam, The Netherlands. <https://www.cyclotron.nl/> under GMP Directive 2003/94/EC. For research and investigational use only.

## Decay table

Physical half-life: 78.41 hours

Hours	1	2	3	4	5	6	7	8	9	10
0	1.000	0.991	0.982	0.974	0.965	0.957	0.948	0.940	0.932	0.924
10	0.915	0.907	0.899	0.891	0.884	0.876	0.868	0.860	0.853	0.845
20	0.838	0.831	0.823	0.816	0.809	0.802	0.795	0.788	0.781	0.774
30	0.767	0.760	0.754	0.747	0.740	0.734	0.727	0.721	0.715	0.708
40	0.702	0.696	0.690	0.684	0.678	0.672	0.666	0.660	0.654	0.648
50	0.643	0.637	0.631	0.626	0.620	0.615	0.610	0.604	0.599	0.594
60	0.588	0.583	0.578	0.573	0.568	0.563	0.558	0.553	0.548	0.543
70	0.539	0.534	0.529	0.524	0.520	0.515	0.511	0.506	0.502	0.497
80	0.493	0.489	0.484	0.480	0.476	0.472	0.468	0.463	0.459	0.455
90	0.451	0.447	0.443	0.439	0.436	0.432	0.428	0.424	0.420	0.417
100	0.413	0.409	0.406	0.402	0.399	0.395	0.392	0.388	0.385	0.382
110	0.378	0.375	0.372	0.368	0.365	0.362	0.359	0.355	0.352	0.349
120	0.346	0.343	0.340	0.337	0.334	0.331	0.328	0.325	0.323	0.320
130	0.317	0.314	0.311	0.309	0.306	0.303	0.301	0.298	0.295	0.293
140	0.290	0.288	0.285	0.282	0.280	0.278	0.275	0.273	0.270	0.268
150	0.266	0.263	0.261	0.259	0.256	0.254	0.252	0.250	0.247	0.245
160	0.243	0.241	0.239	0.237	0.235	0.233	0.231	0.228	0.226	0.224
170	0.223	0.221	0.219	0.217	0.215	0.213	0.211	0.209	0.207	0.205
180	0.204	0.202	0.200	0.198	0.197	0.195	0.193	0.191	0.190	0.188
190	0.186	0.185	0.183	0.182	0.180	0.178	0.177	0.175	0.174	0.172

To obtain a pre-calibration number, divide by the decay factor. For a post-calibration number, multiply by the decay factor.

## BV Cyclotron VU facility in Amsterdam



| Figure 2: BV Cyclotron VU facility in Amsterdam.



| Figure 3: Closeup view of 1 of 3 KIUBE cyclotrons.



| Figure 4: GMP facility.



| Figure 5: Packaging into lead containers.



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