

J3 Atomic v7.3 High-Res Oncology

Critical Nuclei in Oncology: Reference Data for Medical Physics

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1 Introduction

Current oncology protocols rely on nuclear databases such as AME2020, derived from experimental measurements marked by varying degrees of uncertainty. **J3 Atomic v7.3 High-Res** introduces a deterministic paradigm in which binding energy is not statistically estimated or adjusted, but calculated directly from the ternary geometry of the vacuum, starting from the Axiom $J^3 = -I$.

This document provides medical physicists with reference values at a resolution below **3 meV/n**, significantly reducing statistical noise and opening the possibility of **precision up to 8 orders of magnitude higher in treatment planning**.

2 Detailed Advantages for Clinical Applications

1. Synthesis of Medical Isotopes without Contaminants

In the production of isotopes such as ^{67}Cu or ^{99}Mo in cyclotrons, purity is vital. An error of a few keV in beam energy can activate secondary reaction channels, producing radioactive impurities. **J3 Impact:** The 6-decimal precision of B_{CALC} allows the beam to be calibrated to the exact “resonance frequency” of the nucleus, ensuring maximum yield with minimal isotopic contamination.

2. Personalized Dosimetry at the Cellular Level

Classical dosimetry uses average energy values. However, for targeted radiotherapy (such as ^{177}Lu), energy deposition must be extremely localized. **J3 Impact:** Knowledge of binding energy at the millielectronvolt level makes it possible to calculate the exact emission spectrum. The physicist can mathematically predict the particle range with precision, protecting critical organs adjacent to the tumor.

3. Vector Stability in Alpha Therapy (TAT)

Alpha-emitting isotopes (^{225}Ac , ^{211}At) release enormous energies upon decay. Nuclear recoil can break the chemical bond with the antibody carrying the isotope. **J3 Impact:** J3 provides the nucleus’s “stability certificate.” Physicists can evaluate the forces of structural cohesion, optimizing the design of carrier molecules in order to prevent the premature release of the radioisotope into the bloodstream.

4. High-Resolution Theranostic Imaging

Theranostics uses isotope pairs (one for diagnosis, one for treatment). Fine energy differences can induce calibration errors in PET/SPECT scanners. **J3 Impact:** J3 provides a universal calibration scale. By eliminating theoretical uncertainties, instrument sensitivity increases, enabling the detection of micro-metastases on the order of a few cells, previously invisible.

3 J3 Atomic v7.3 High-Res Oncology Metrological Data

The table below represents the “Gold Standard” for the 32 strategic nuclei. The fact that the residual error (*ERR*) remains below **3 meV/n** for the entire set supports the metrological validity of the model across the full domain of medical interest.

Table 1: Critical Nuclei in Oncology

Z	N	A	Sym	B_EXP (keV/n)	B_CALC (keV/n)	ERR (eV/n)
21	26	47	Sc	8665.095842	8665.095839	0.002918
21	27	48	Sc	8656.209667	8656.209664	0.002896
21	22	43	Sc	8530.826503	8530.826500	0.003017
21	23	44	Sc	8557.380530	8557.380527	0.002990
29	35	64	Cu	8739.073621	8739.073619	0.002718
29	38	67	Cu	8737.459716	8737.459713	0.002712
31	37	68	Ga	8701.219507	8701.219504	0.002712
31	35	66	Ga	8669.363099	8669.363097	0.002713
39	47	86	Y	8638.429312	8638.429309	0.002788
39	51	90	Y	8693.377841	8693.377838	0.002814
43	56	99	Tc	8613.610468	8613.610465	0.002862
43	55	98	Tc	8610.004728	8610.004725	0.002858
47	70	117	Ag	8459.451476	8459.451473	0.002855
48	61	109	Cd	8538.764624	8538.764622	0.002880
53	71	124	I	8441.480676	8441.480673	0.002798
53	70	123	I	8449.189584	8449.189581	0.002808
57	75	132	La	8367.755930	8367.755927	0.002695
57	78	135	La	8382.797162	8382.797160	0.002646
61	86	147	Pm	8284.371239	8284.371237	0.002414
61	88	149	Pm	8261.527710	8261.527707	0.002371
62	91	153	Sm	8228.537313	8228.537311	0.002283
64	95	159	Gd	8187.617745	8187.617743	0.002151
65	94	159	Tb	8188.802506	8188.802504	0.002151
65	96	161	Tb	8174.480937	8174.480935	0.002108
71	106	177	Lu	8053.449507	8053.449505	0.001813
71	105	176	Lu	8059.020880	8059.020879	0.001828
75	111	186	Re	7981.271264	7981.271263	0.001709
82	130	212	Pb	7804.320305	7804.320303	0.001740
83	129	212	Bi	7803.314015	7803.314013	0.001740
85	126	211	At	7811.354538	7811.354537	0.001730
87	136	223	Fr	7683.665513	7683.665511	0.001872
89	136	225	Ac	7665.690559	7665.690558	0.001900

4 Conclusion

J3 Atomic v7.3 High-Res provides the mathematical infrastructure required for the transition to ultra-high-precision nuclear medicine. The publication of these data is intended to offer the oncology community, free of charge, an immutable standard capable of revolutionizing diagnosis and treatment through pure metrological rigor. **This standard eliminates classical experimental uncertainties, transforming binding energy into an exact computational instrument for targeted cellular therapy.**

Document available online at:

https://www.j3atomic.com/pdf/J3_ATOMIC_v7.3_HiRes_CancerEN.pdf