CNIC
CANADIAN
NUCLEAR ISOTOPE
COUNCIL

ISOTOPE

161

Tb

Terbium

Terbium-161
Advancing the future of cancer care

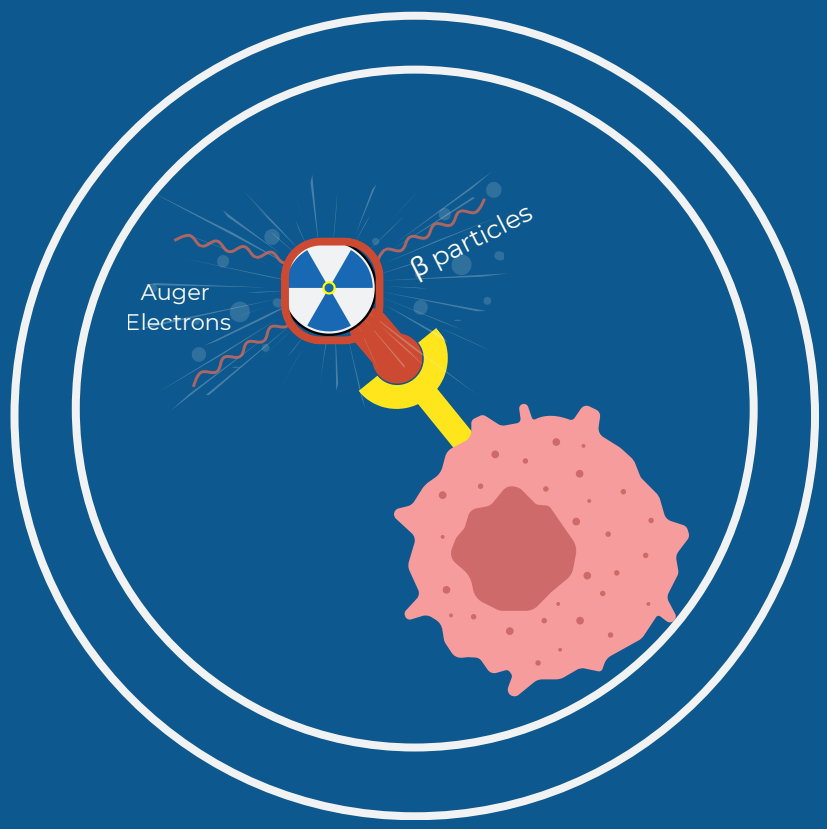
Feature of the Month

Terbium-161

Terbium-161 (Tb-161) is an emerging radionuclide that is shaping the next-generation of radiopharmaceuticals. Tb-161 is a highly promising medical isotope used for targeted radionuclide therapy (TRT) that combines the proven benefits of Lutetium-177 (Lu-177) with an added advantage of Auger electrons.

What is Tb-161?

Tb-161 is a medical isotope that has recently been identified as a potential treatment for metastasized prostate cancer and neuroendocrine tumors.



Tb-161 emits Auger electrons which allows for highly concentrated energy over very short distances.

Challenges

Despite Tb-161's promising attributes , the widespread adoption and usage of Tb-161 faces several challenges due to production, supply, logistics and regulatory obstacles:

- Tb-161 is difficult to produce in large scale commercial quantities due to limited supply of highly enriched Gadolinium-160 (Gd-160) targets, availability of higher energies in commercial cyclotrons, and isotope separation techniques.
- Tb-161 has a short half-life of only 7 days, presenting logistical challenges
- Regulatory approvals for clinical trials cause delays in patient access

Terbium-161

Theranostic Capabilities

Tb-161 is an emerging theranostics agent to treat a variety of cancers due to its decay capabilities. As Tb-161 decays, it releases three different types of particles:

- High Energy Electrons
- Low Energy Electrons
- Low Energy Photons

High energy electrons treat larger tumors but risk damaging healthy tissue due to their long range, whereas low energy electrons target smaller tumors precisely, sparing healthy tissue with their short range.

Canadian Leadership

In January 2025, Kinectrics and Isotopia announced a groundbreaking partnership for the development of Tb-161. Kinectrics will provide Isotopia with a reliable supply of highly enriched Gd-160. This critical isotope will enable Isotopia's production of Tb-161.

KINECTRICS

isotopia
Nuclear Medicine

TMC Group, located in Vancouver, BC, specializes in the development and production of enriched stable isotopes for medical and industrial applications. TMC Group produces Gd-160, a key ingredient for creating Tb-161, and currently has quantities available.

TMC

References

Holiski, C. K., et al.,(2024). The Production and Separation of ^{161}Tb with High Specific Activity at the University of Utah. *Applied Radiation and Isotopes 214*, 111530 . [DOI: 10.1016/j.apradiso.2024.111530]

Isotopia. (2025). *Terbium 161 for Targeted Radionuclide Therapy in Oncology. https://isotopia-global.com/terbium-161-for-targeted-radionuclide-therapy-in-oncology/*

Kinectrics. (2025). *Kinectrics Enters Agreement with Isotopia to Supply Gadolinium-160 (Gd-160), Supporting the Production of Terbium-161 (Tb-161) for Advanced Radiotherapeutics*. https://www.kinectrics.com/media-center/news-releases/2025-kinectrics-enters-agreement-with-isotopia

Müller, C., van der Meulen, N.P. & Schibli, R. (2023). Opportunities and potential challenges of using terbium-161 for targeted radionuclide therapy in clinics. *Eur J Nucl Med Mol Imaging* 50, 3181–3184. https://doi.org/10.1007/s00259-023-06316-y

Naskar N and Lahiri S (2021) Theranostic Terbium Radioisotopes: Challenges in Production for Clinical Application. *Front. Med. 8:675014*. doi: 10.3389/fmed.2021.675014

NRG Pallas.(2025). *Terbium-161 (Tb-161)* . https://www.nrgpallas.com/medical-isotope-solutions/radioisotopes/terbium-161

Peter Mac News. (2025). *“Incredibly encouraging” first results of Terbium prostate cancer therapy.* https://www.actineer.com/articles/actineer-advances-ac-225-production

University of Missouri. (2025). *Mizzou scientists work to boost lifesaving cancer treatments. https://www.murr.missouri.edu/mizzou-scientists-work-to-boost-lifesaving-cancer-treatments*

CNIC
CANADIAN
NUCLEAR ISOTOPE
COUNCIL