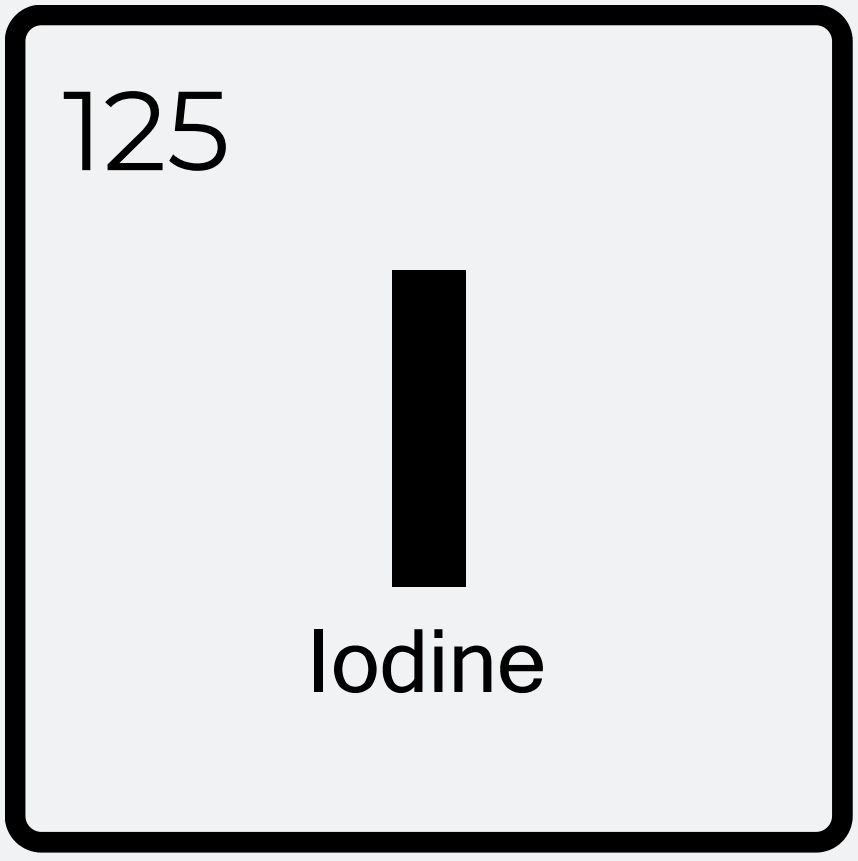
CNIC
CANADIAN
NUCLEAR ISOTOPE
COUNCIL

ISOTOPE



Iodine-125

The Brachytherapy Breakthrough

Feature of the Month

Iodine-125

Iodine-125 (I-125) is advancing localized cancer treatment through its targeted low-energy gamma ray emissions.

I-125 market size is expected to reach up to $482 MillionUSD by 2033

Half-life of 59.4 days

How Does it Work?

Brachytherapy is a type of internal radiation therapy in which seeds, ribbons, or capsules that contain a radiation source are placed in the body, in or near the tumor. It is used to treat various diseases. For instance, prostate brachytherapy is preformed by carefully placing I-125 seeds inside the prostate gland.

Over time, the I-125 seeds release radiation to destroy the cancer cells or slow down the growth.

I-125 seeds are small in size and are comparable to a grain of rice

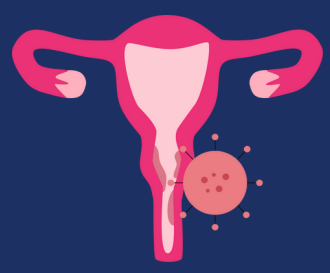
I-125 brachytherapy seeds next to an American penny for size comparison

Iodine-125

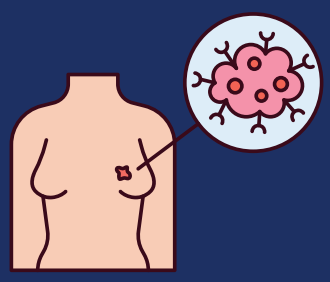
How is it used?

I-125 is the most widely used radioactive sealed source for interstitial permanent brachytherapy. It can also be used to evaluate the filtration rate of kidneys and to diagnose deep vein thrombosis in the leg. Below are some types of cancers that are treated with I-125:

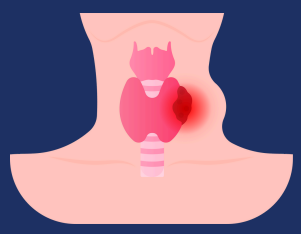
Prostate Cancer



Gynecological Cancer



Breast Cancer

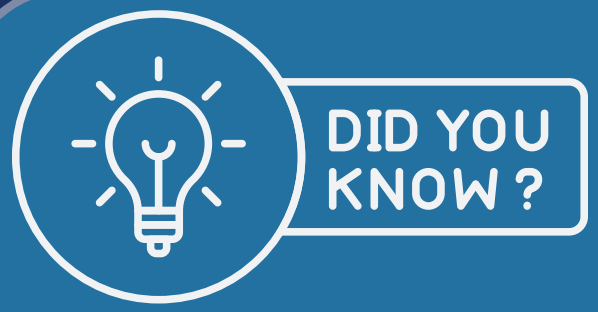


Head and Neck Cancer

Eye Cancer

How is it produced?

I-125 cannot be produced in small cyclotrons or generators. The availability of I-125 remains is tied to reactor infrastructure. In Canada, I-125 is produced in the McMaster Nuclear Reactor (MNR), which is the the most powerful research reactor in Canada.



Initially, I-125 interstitial permanent brachytherapy was only used in the treatment of rare tumors. However, an increasing number of clinical trials upheld the efficacy and safety of I-125 BT in almost all tumors.

Case Study on Canada's Leadership

Canada is known around the world for its leading production of I-125, as one of only two producers globally. During the 1990s, the global demand for I-125 grew significantly and quickly outpaced the global supply. McMaster University developed an innovative process to produce I-125 from Xenon-124 using the MNR. Today, the MNR produces over 60% of the global demand for I-125.

In 2025, the Ontario government announced an $18 million investment to increase production of life-saving medical isotopes at the MNR. This investment will enable the MNR to reach 24/7 operations, expanding the supply of I-125 to treat over 84,000 cancer patients annually.

CNIC
CANADIAN
NUCLEAR ISOTOPE
COUNCIL

References

Alberta Health Services. (2016). *Prostate Brachytherapy Patient Information*. https://www.albertahealthservices.ca/assets/info/cca/if-cca-prostate-brachytherapy-radioactive-iodine125-seed-implant.pdf

National Cancer Institue. (2025*). Brachytherapy to Treat Cancer*. *https://www.cancer.gov/about-cancer/treatment/types/radiation-therapy/brachytherapy*

Ontario Investing $18 Million to Boost Life-Saving Medical Isotope Production at McMaster University. https://news.ontario.ca/en/release/1006465/ontario-investing-18-million-to-boost-life-saving-medical-isotope-production-at-mcmaster-university

Verified Market Reports. (2025). *Iodine-125 Market Size, Trends, SWOT & Forecast*. *https://www.verifiedmarketreports.com/product/iodine-125-market/*

Wei, S., Li, C., Li, M., Xiong, Y., Jiang, Y., Sun, H., Qiu, B., Lin, C. J., & Wang, J. (2021). Radioactive Iodine-125 in Tumor Therapy: Advances and Future Directions. *Frontiers in oncology*, 11, 717180. https://doi.org/10.3389/fonc.2021.717180

World Nuclear Association. (2025). *Radioisotopes in Medicine. https://world-nuclear.org/information-library/non-power-nuclear-applications/radioisotopes-research/radioisotopes-in-medicine*

CNIC
CANADIAN
NUCLEAR ISOTOPE
COUNCIL