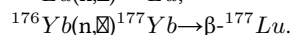
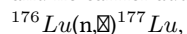


Production and Chemical Separation of No Carrier Added (nca) Lutetium-177.

Lutetium-177 dotatate gained FDA approval for use in certain neuroendocrine tumors, opening the door for research looking at other avenues of radiopharmaceutical use. With a half-life of 6.647 days and average β -particle range in soft tissue of $\sim 670 \mu\text{m}$, ^{177}Lu has promise for other therapy applications. Another benefit of ^{177}Lu is that it produces low energy gammas (113 keV, 208 keV), suitable for imaging purposes, allowing biodistribution and excretion kinetics to be monitored. Lutetium-177 can be produced as carrier added (ca) and no carrier added (nca) from enriched ^{177}Lu or ^{176}Yb , respectively by two production routes:



The latter requires separation of Lu from the Yb target following irradiation. The ORNL High Flux Isotope Reactor (HFIR) with a max thermal neutron flux of $2.1 \times 10^{15} \text{ n} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$ (85 MW) is ideally suited to produce high specific activity ^{177}Lu . Separating nca ^{177}Lu is a complex process because it requires separating micro amounts of ^{177}Lu from macro amounts of ^{176}Yb and they are both part of the lanthanide series. The best method of separation will be tested from previous work to come up with a method that will cut down on waste, time, and improve the overall radio-purity of ^{177}Lu .

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