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Actinium-225 (t1/2 = 10.0 ± 0.1 d) is one of the more effective radioisotopes used in alpha radioimmunotherapy. It has been used to treat many forms of cancer including glioblastoma, acute myeloid leukemia, prostate cancer, and breast cancer. Actinium-225 can be directly applied in vivo or used as a generator of the short-lived daughter product 213Bi (t1/2 = 45.59 ± 0.06 minutes). Actinium-225 can be produced directly via cyclotron through the 226Ra(p,2n)225Ac reaction or by high energy proton spallation (Ep > 90 MeV) of thorium targets. However, because of its ten-day half-life, it is more efficient to create its precursor, 229Th (t1/2 = 7932 ± 28 years). Current supplies of 229Th originate from the decay of 233U [t1/2 = (1.592 ± 0.002) x 105 y], but that supply is insufficient to support the demand for 225Ac and access to 233U is limited. In order to close the gap between supply and demand of 225Ac, work has been initiated at Oak Ridge National Lab to produce 229Th through the irradiation of 226Ra targets in the High Flux Isotope Reactor. This method to produce 229Th will be presented and compared to previous studies performed at ORNL to produce 229Th through the low energy proton bombardment (Ep < 40 MeV) of 232Th at the Holifield Radioactive Ion Beam Facilities Tandem Accelerator.

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