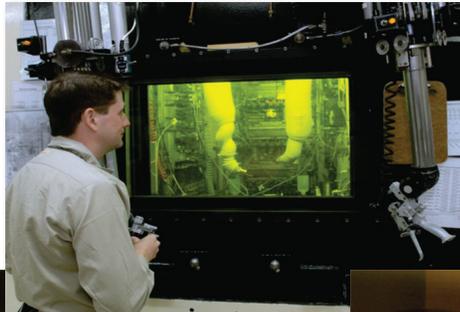


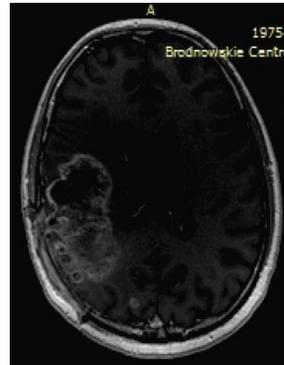
Cancer Treatment Applications at Institutions and Hospitals

Targeted molecular antibody and peptide vehicles containing Ac-225/Bi-213 offer selective binding to biomolecules which attach to cancer cells.

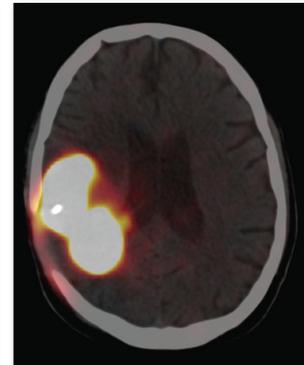
- Acute myeloid leukemia
- Non-Hodgkin lymphoma
- Gastric cancer
- Brain tumors
- Prostate cancer
- HIV infection and viral cancers



Target Processing and Purification at ORNL



MRI image of glioblastoma patient before treatment with Bi-213-SubstanceP



PET/CT image 30 min post intratumoral coinjection of Bi-213-SubstanceP/Ga-68-SubstanceP demonstrating the distribution of the alpha emitter at the tumor site



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Isotope Program



Tri-Lab R&D Effort: Actinium-225 Production

Large Scale Accelerator-Based Production of the Cancer-Treatment Agent Actinium-225

DOE's Office of Science, Office of Nuclear Physics has recently granted approval of a Tri-Lab research effort to provide accelerator-produced ^{225}Ac for radioimmunotherapy. Oak Ridge National Laboratory (ORNL), Brookhaven National Laboratory (BNL) and Los Alamos National Laboratory (LANL) make up the Tri-Lab team. The Tri-Lab team will leverage accelerator capabilities at BNL's Brookhaven Linac Isotope Producer and LANL's Isotope Production Facility along with ORNL's extensive experience with the processing of ^{225}Ac from ^{229}Th . The long term goal is to provide up to curie amounts of ^{225}Ac to users each year.



New York City's Times Square

Los Alamos scientist Meiring Nortier holds a thorium foil test target for the proof-of-concept production experiments. Research indicates that it will be possible to match current annual, worldwide production of Ac-225 in just two to five days of operations using the accelerator at Los Alamos and analogous facilities at Brookhaven.

The initial research scope is concentrated on production target development, chemical process methodology improvements, and irradiation parameters to evaluate the associated impacts on the quality of both a final ^{225}Ac product and a $^{225}\text{Ac}/^{213}\text{Bi}$ generator. One of the key impacts to be assessed under the Tri-Lab collaboration relates to the content of ^{227}Ac in the final product and its associated influence on the direct application of ^{225}Ac or on use of the associated generator product, ^{213}Bi . Quality is initially being assessed via a series of evaluation campaigns in which small amounts of accelerator-produced ^{225}Ac product and/or $^{225}\text{Ac}/^{213}\text{Bi}$ generators are being made available to researchers and clinicians to evaluate the applicability of the accelerator-produced material relative to material derived from ^{229}Th . Preliminary feedback from early $^{225}\text{Ac}/^{213}\text{Bi}$ generator evaluation experiments has been encouraging. The generators produce a ^{213}Bi product of equal quality and applicability, with the direct labeling efficiency being similar to that of the ^{229}Th generated material. Near-term effort will focus on the toxicity and dosimetry impacts of ^{227}Ac associated with the direct application of accelerator-produced ^{225}Ac .



10g Th target irradiated at IPF in support of preliminary $^{225}\text{Ac}/^{213}\text{Bi}$ generator evaluation studies. Note the uniform, rastered beam pattern in the exit window.

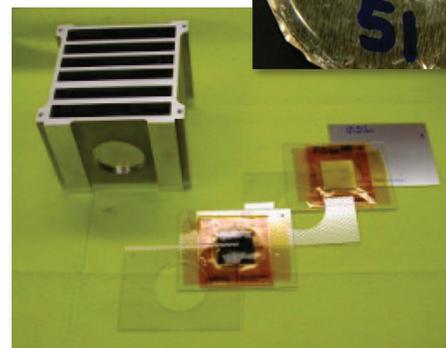


Isotope Production Facility (LANL)



Brookhaven LINAC

Production Facilities at LANL and BNL



Thorium-232 target development (LANL-BNL)

Target Development at LANL and BNL