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
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 $^{225}$Ac/$^{213}$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 $^{225}$Ac/$^{213}$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 $^{225}$Ac/$^{213}$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.