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From Imaging to Treatment - medical isotopes at TRIUMF

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TRIUMF has a long history of medical isotope production. The Life Science Division produces PET tracers for the local hospitals for over 40 years. Recently, we have taken on the challenge to expand our isotope repertoire. Next to the more traditional PET isotopes F-18 and C-11, we are producing radiometals (Tc-94m, Sc-44, Y-86, Zr-89, Ga-68, Cu-61) in liquid targets on our 13MeV cyclotron. These radiometals are now available on short notice without a solid target infrastructure, and greatly advance research in radiochemistry. Additional efforts at 19–24 MeV have established an alternative production method for Tc-99m, bypassing the need for nuclear reactors and with it highly enriched uranium targets. The team has demonstrated 15 Ci production on a small 19 MeV cyclotron, enough to supply the Greater Vancouver area with Tc-99m. And finally, we utilized the 500 MeV TRIUMF cyclotron to produce alpha emitters which can be used for therapeutic applications utilizing their high LET. So far, At-211 was isolated as a promising alpha-emitter to treat malignancies such as leukemia. The production of Ra-223/224/225, parent isotopes of Ac-225 and Bi-213 with similar applications in targeted alpha-therapy, is also studied.