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**From Beamline to Scanner with $^{225}$Ac**[1] ANDREW K. H. ROBERTSON, CATERINA F. RAMOGIDA, PETER KUNZ, TRIUMF, CRISTINA RODRIGUEZ-RODRIGUEZ, University of British Columbia, PAUL SCHAFFER, TRIUMF, VESNA SOSSI, University of British Columbia — Due to the high linear energy transfer and short range of alpha-radiation, targeted radiation therapy using alpha-emitting pharmaceuticals that successfully target small disease clusters will kill target cells with limited harm to healthy tissue, potentially treating the most aggressive forms of cancer. As the parent of a decay chain with four alpha- and two beta-decays, $^{225}$Ac is a promising candidate for such a treatment. However, this requires retention of the entire decay chain at the target site, preventing the creation of freely circulating alpha-emitters that reduce therapeutic effect and increase toxicity to non-target tissues. Two major challenges to $^{225}$Ac pharmaceutical development exist: insufficient global supply, and the difficulty of preventing toxicity by retaining the entire decay chain at the target site. While TRIUMF works towards large-scale (C̃i amounts) production of $^{225}$Ac, we already use our Isotope Separation On-Line facility to provide small ($< 1$ mCi) quantities for in-house chemistry and imaging research that aims to improve and assess $^{225}$Ac radiopharmaceutical targeting. This presentation provides an overview of this research program and the journey of $^{225}$Ac from the beamline to the scanner.

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