

Production of unconventional radioisotopes, radiochemistry development and preclinical studies for cancer theranostics at TRIUMF

Tuesday 6 September 2022 16:40 (40 minutes)

Using unconventional radionuclides for cancer treatment has been gaining popularity in recent years thanks to the remarkable results from the clinical studies with ^{177}Lu , ^{223}Ra and ^{225}Ac ^{1–3}. TRIUMF launched a campaign to produce ^{225}Ac from ^{232}Th spallation⁴. Benefiting from this program, several other interesting alpha-emitters are co-produced, including ^{213}Bi , ^{227}Th , and ^{212}Pb , which we have developed processes to purify⁵. TRIUMF's ISOL facility allows the production of Tb isotopes, including ^{155}Tb which we use as an imaging companion for ^{225}Ac and ^{177}Lu ⁶.

Those unconventional radionuclides require specific chelators for efficient and stable labelling, due to their larger sizes and different chemical properties compared to conventional radiometals. We have developed several novel chelators for those radionuclides⁷. The novel chelators were attached to tumour targeting peptides and were subsequently labelled with radioisotopes.

Preclinical imaging and biodistribution studies with peptides targeting melanoma or neuroendocrine tumour were performed, and the results demonstrated tumour specific uptake and low background uptake, indicating the promises of the novel radionuclides and chelators. Therapy studies with ^{225}Ac is undergoing.

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Session Classification: Research on targeted radionuclide therapy and associated technologies

Track Classification: Targeted radionuclide therapy and associated technologies