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Radiotracers for detection of glycolysis in cancer cells

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Abstract

Upregulation of glycolysis is one of the hallmarks of cancer. This process is characterized by increased uptake of glucose by proliferating cancer cells and it is supported by overexpression of glucose transporters (especially GLUT1 and GLUT3), and overactivation of hexokinase enzyme. There is a clinical correlation between increased GLUT1 expression and cancer initiation, progression, and poor treatment outcome. High expression of GLUT1 has been observed in multiple types of cancers such as, lung, breast, colorectal, bladder, gastric cancers, and pituary hepatocellular carcinoma. Thus, enzymes involved in the glycolytic pathway and GLUT1 transporters can be exploited as targets for development of new diagnostic and therapeutic agents. To-date, ^{18}F-FDG is the only clinically approved tracer targeting metabolic pathways in tumors. There is ongoing effort to develop diagnostic agents with specificity and sensitivity equal or superior to ^{18}F-FDG but produced without the use of cyclotron. For the last few years, we have been working on design and selection of tracers that target metabolic pathways in cancer and can be produced from a generator rather than cyclotron. The result is a novel class of ^{68}Ga-labeled radiopharmaceuticals (RMX-GC). These chelator-based agents have shown high tumor-specific uptake with limited uptake by normal organs (brain, heart) as tested in breast (SKBR3), prostate (PC3), and small lung (A549) xenographed models. They can be also prepared on-demand with no access to cyclotron facility. In this presentation, I will discuss our results on design and validation our lead candidates, RMX-GC as new PET imaging agents.

Biography

Originally trained as a clinical pharmacist and organic chemist, I completed my Ph.D in the Polish Academy of Science and at the Frankfurt University, followed by postdoctoral fellowship at Rice University. I am co-founder and Director of Research and Drug Development of RadioMedix Inc., radiopharmaceutical company focused on commercialization of imaging and therapeutic radiotracers. I received International Sigma-Aldrich Award and IUPAC Award. I publish in peer-reviewed journals, and serve on the NIH panel reviews and journal's editorial boards. My research interests are at cross section of bioconjugate-chemistry and radiopharmacy with special focus on design of radiolabeled-theranostic agents targeting cancer cells.