



Preclinical nuclear medicine and magnetic resonance imaging for theranostic radiopharmaceutical development

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The development of radiopharmaceuticals for use in nuclear medicine for the diagnosis and treatment of disease is a highly interdisciplinary field that integrates elements of engineering, materials science, physics, chemistry, and biology. It requires the use of a wide variety of specialty equipment, like particle accelerators, automated radiochemical synthesizers, and imaging systems, such as positron emission tomography (PET) or single photon emission computed tomography (SPECT) that provide biochemical information-rich spatial images, which are often paired with a second modality, such as x-ray computed tomography (CT) or magnetic resonance imaging (MRI) to provide accurate anatomical references. In this presentation, Dr. Ellison will discuss recent efforts to develop novel theranostic small molecule radiopharmaceuticals for PET imaging and radiopharmaceutical therapy of glioblastoma through targeting system xC⁻, a cell surface antiporter that exchanges cystine and glutamate as a key part of the cellular antioxidant defense system. Using modern chemically versatile halodeborylation chemistries, Dr. Ellison's laboratory has prepared homologously matched radiopharmaceuticals that emit a variety of medically useful radiations, including positrons (¹⁸F, ⁷⁷Br) and photons (¹³¹I) for imaging and Auger electrons (⁷⁷Br) and beta particles (¹³¹I) for therapy. Comparative biology studies of this family of compounds utilize the gamut of preclinical imaging technologies, including PET, SPECT, CT, and MRI.



About the Speaker

Paul Ellison received a BS in Chemistry and Mathematics from the University of Wisconsin, Madison in 2006 and a PhD in Physical Chemistry from the University of California, Berkeley in 2011. Returning to Madison, he completed postdoctoral training in Radiological Sciences in 2015 and served as an assistant scientist until 2020, when he was appointed as an assistant professor in the University of Wisconsin Department of Medical Physics. Dr. Ellison is trained in nuclear and radiochemistry and his research interests include the synthesis and preclinical evaluation of theranostic radiopharmaceuticals for use in nuclear medicine. Working closely with collaborators in medical physics, radiology, obstetrics and gynecology, and radiation medicine, his laboratory vertically integrates the radiopharmaceutical development process – from radionuclide production to radiopharmaceutical synthesis, to radiobiological evaluation. His group has been funded by the Department of Defense, the Society of Nuclear Medicine and Molecular Imaging, National Institute of Health and industrial research partners to investigate novel theranostic radiopharmaceuticals for cancers with especially challenging outcomes: metastatic ovarian cancer, neuroblastoma, and glioblastoma. He is passionate about facilitating hands-on, experimental research experiences to undergraduate and graduate students through his involvement with a Department of Energy funded national workforce development program focused on radionuclide production.

Monday, April 27 at Noon
1003 Engineering Centers (Tong Auditorium)

