

Mark Wolf, Biochemistry

University: University of Missouri-Columbia

Year in School: Senior

Hometown: Ballwin, MO

Faculty Mentor: Dr. Thomas Quinn, Biochemistry

Funding Source: Life Sciences Undergraduate Research Opportunity Program

Synthesis of a prosthetic group for radiolabeling of Melanoma targeting peptide Re-CCMSH

Mark Wolf, Xiuli Zhang, and Thomas Quinn

There is currently no cure for malignant melanoma and the best hope for a patient is early diagnosis and surgical excision. A promising approach to early cancer diagnosis is the use of radiolabeled peptides for tumor imaging. Dr. Quinn's lab has developed a cyclized peptide analog of alpha-Melanocyte stimulating hormone called ReCCMSH which binds to over expressed melanocortin-1 receptors on the tumor cells. A common radioimaging technique in nuclear medicine is positron emission tomography (PET). The radionuclide, fluorine-18, is widely used as a labeling agent for PET studies because of its 110 minute half life and low energy and is thus a good candidate for radiolabeling of our peptide. However, direct fluorination of the peptide is not possible. To radiolabel the peptide, a prosthetic group must be developed that can be attached to the peptide and act as a fluorine acceptor. This prosthetic group must not alter the biological properties of the peptide including receptor affinity, rapid body clearance, and absence of side reactions. The organic synthesis of this prosthetic group was the focus of my research. Previous attempts at radiolabeling of the conjugated peptide have been inefficient multi-step syntheses and thus impractical. For my research, a benzyl aldehyde was modified through a series of reactions to create carboxyl-3-cyano-4-N,N,N-trimethylanilinium triflate. This compound can be coupled to the end of the peptide and subsequently radiolabeled in one efficient step. The peptide was synthesized via solid phase peptide synthesis and cyclized via rhenium metal coordination. The actual radiolabeling of the conjugated peptide along with the in vivo biodistribution studies on mice will be pursued over the next academic year.