COLLEGE OF PHARMACY
PHARMACEUTICAL SCIENCES
UNIVERSITY OF MICHIGAN

Pharmaceutical Sciences Seminar Series

Wednesday, March 27, 2024
4:00pm
NCRC Building 10 South Atrium
Zoom

"Investi Investigation into the mechanisms and optimization of remote-loading encapsulation of peptides in PLGA/PLA microspheres"

Presented by:

John McClay
Ph.D. Candidate, Pharmaceutical Sciences
University of Michigan

Abstract As the pharmaceutical industry continues to grow, so does the challenge to deliver formulated drugs safely and effectively in a patient compliant manner. All drugs cannot be delivered by simple and desirable daily oral formulations. For example, peptides are one important drug class in which successful noninvasive delivery is lacking and often require invasive injections. A current approach to combat this issue are long-acting controlled-release polymer matrix drug delivery systems (DDSs). The DDS option consists of the active pharmaceutical ingredient (API) being encapsulated in a biocompatible polymer matrix. In addition to providing slow exposure of the drug to the body over long periods, this matrix can be utilized to improve drug stability, allow for API targeting, inhibit API degradation, and improve patient compliance. In particular, a DDS consisting of FDA approved biocompatible PLGA/PLA polymer microspheres will undergo a novel remote loading method to avoid exposing APIs to high temperatures, shear forces, organic solvents, and harsh processing methods which can denature or degrade peptides and other biologics. Model peptides will be remote loaded under various buffer conditions to increase particle loading, limit burst release, and extend the duration of action of therapeutic peptides. Analysis of said loading and release will be performed via UPLC and CHN detection. Particle characteristics such as size and shape will be evaluated via Mastersizer and SEM data. Based on release data and particle characteristics, a psuedo-zero order release may be attainable utilizing a blend of polymer formulations and an optimized remote loading procedure. The introduction of certain fatty acids within the polymer matrix have been shown to further prolong peptide release for 24-weeks. Ultimately, providing long term constant peptide relief within the desired therapeutic window to increase patient compliance, and provide a framework for other peptide therapies.