Monday
AUGUST 27
3:00PM • COMMUNICORE, C1-17

UF BME SEMINAR SERIES

Whitney L. Stoppel, Ph.D.

Assistant Professor,
Department of Chemical Engineering,
University of Florida

Dr. Whitney Stoppel received a bachelor's degree in chemical and biomolecular engineering from Tulane University in 2008 and a Ph.D. in chemical engineering from the University of Massachusetts Amherst in 2014. As a graduate student, she was funded via an NIH T32 Chemistry-Biology Interface (CBI) Graduate Fellowship and an NSF IGERT Institute for Cellular Engineering (ICE) Graduate Fellowship at UMass Amherst. Following her Ph.D., she was a postdoctoral fellow in the Biomedical Engineering Department at Tufts University under the advisement of David L. Kaplan and Lauren D. Black III, where she worked on the design, development, and optimization of silk-based biomaterials for the regeneration cardiac of tissue. As a postdoc, she was funded by an NIH IRACDA postdoctoral fellowship, participating in the Training in Education and Critical Research Skills (TEACRS) program at Tufts University. Dr. Stoppel joined the Chemical Engineering Department at the University of Florida in July 2018 and her lab will continue efforts to design personalized biomaterials for preventing fibrosis and scar tissue formation within soft tissues.

Developing Personalized Biomaterials: An Investigation into Striated Muscle

Insufficient muscle repair and regeneration is a major clinical issue that plagues both young patients born with congenital defects and elderly patients, such as those who have suffered a heart attack or experienced a traumatic injury resulting in volumetric muscle loss. The progression of these diseases and injuries can lead to significant complications, such as amputation, or in the case of heart muscle, progression to heart failure. Heart failure is the leading cause of death for adults in the US and one of the leading causes of death in live born infants. In both skeletal and heart muscle disease or repair, invasive surgical repair procedures result in detrimental scar tissue formation and the weakening of the surrounding muscle, limiting long-term positive patient outcomes. To correct and improve these issues, natural, bioactive, biodegradable, and implantable biomaterial systems have and are continuing to be evaluated. Current research suggests that electrical, spatial, and chemical cues are important design parameters for biomaterials with applications in striated muscle tissue regeneration. During this seminar, I will highlight recent efforts to develop a variety of materials suitable for studying fundamental concepts in striated muscle tissue engineering *in vitro*, as well as highlight recent efforts centered on repairing diseased cardiac tissue *in vivo*. To this end, we developed sponge and hydrogel-based cell-free biomaterials using silk fibroin and decellularized cardiac extracellular matrix (cECM) derived from adult or fetal porcine heart tissue. We optimized and evaluated these materials using a combination of traditional cell culture techniques and bioreactor studies *in vitro* and via subcutaneous implantation or application to the heart *in vivo*, in models of rodent myocardial infarction and porcine right ventricular outflow tract repair. For example, utilization of acellular silk-cECM sponges in the repair of myocardial infarction has led to a reduction in scar expansion and improved cardiac function in adult rats, compared to untreated controls. Results from our *in vivo* studies highlight the complexity of the wound healing process, which leads to alterations in tissue organization, the distribution of cells types within the tissue, and the level of vascularization. Current and future work aims to evaluate the role of the immune system in the modulation of repair and regeneration, focusing on improving biomaterial formulations through a greater understanding of cell-material interactions. Results will lead to the development of personalized biomaterials that harness the power of the immune system to promote regeneration and repair of diseased or damaged muscle tissue, emphasizing development of a natural biomaterial-based platform for surgeons aiming to meet the needs of their specific patients. Much of this work was completed in collaboration with Kelly E. Sullivan-Giachetto and Jonathan M. Grasman under the advisement of David L. Kaplan and Lauren D. Black, III, in the Biomedical Engineering Department at Tufts University during my postdoctoral studies as an NIH IRACDA Scholar.

UF UNIVERSITY of FLORIDA
J. Crayton Pruitt Family Department of Biomedical Engineering

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UPCOMING SEMINARS

Xin Tang, Ph.D.
SEPTEMBER 10, 2018
Assistant Professor,
Department of Mechanical & Aerospace Engineering,
University of Florida

Ivan Howard, M.S.
SEPTEMBER 17, 2018
Investment Officer,
Hirtle, Callaghan & Co.

Roberta Goode, M.S.
SEPTEMBER 24, 2018
President,
Goode Compliance International

Questions? Contact admin@bme.ufl.edu