Joint Department of

BIOMEDICAL ENGINEERING

UNC CHAPEL HILL | NC STATE UNIVERSITY

Coulter Seminar Series Presents

"Exploring the role of satellite cells in vascular biology and peripheral artery disease"

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Laura Hansen received her BS in Bioengineering from the University of Pittsburgh in 2007 and her PhD in Bioengineering from the Georgia Institute of Technology in 2012. She worked Dr. Rudy Gleason's lab on the biomechanics of bloods vessel focused on characterizing early indicators of atherosclerosis such as stiffening and thickening in mouse models of HIV proteins and an antiretroviral (ART) drug. Her post-doctoral fellowship was in Dr. W. Robert Taylor's lab at Emory University in Cardiology. Her postdoctoral research focused on the role of RAGE (receptor for advance glycation end products) and diabetes in the development of collateral vessels. In 2019 she joined the Department of Medicine and Division of Cardiology at Emory University as an Assistant Professor and received a Career Development Award from the American Heart Association. Her lab studies the interactions between satellite cells and the vasculature. Satellite cells are skeletal muscle progenitor cells that are known to play an important role in muscle repair after injury and adaptation to exercise. However, her lab focuses on a previously underexplored role of satellite cells in vascular growth. This area is of particular interest in the context of peripheral artery disease (PAD), where patients suffer from ischemic tissue damage but treatment options are still limited. Her lab is exploring ways to harness their angiogenic properties in vivo or through therapeutically delivered cells as well as evaluating the role satellite cells plays in the effectiveness of exercise therapy in PAD.

ABSTRACT

Peripheral artery disease (PAD) remains a major health problem; there are currently more than 8.5 million people age 40 and over in the United States with this disease, and 202 million people affected globally. PAD often first manifests as pain especially with physical exertion due to inadequate blood supply and oxygen delivery to the muscle tissues. However, as the disease progresses chronic hypoxia can cause ischemic tissue damage that can result in ulcers, infections, and amputations. Current treatment strategies for PAD patients are lifestyle changes such as smoking cessation, increased physical activity, and weight loss as well as pharmacological treatments such as statins and antiplatelet therapy. However, patients with more severe disease often don't respond to these strategies and require surgical or percutaneous interventions. One important indicator of a good prognosis in response to the lifestyle modifications is the development of a robust collateral network. A better understanding of the biology and cells involved in vascular growth will allow the development of more effective therapies. We propose that satellite cells, skeletal muscle progenitor cells that are known to play an important role in muscle repair after injury and adaptation to exercise, maybe interact with vascular cells to regulate these processes. To support this previously underexplored role of satellite cells in vascular growth, we have found that satellite cells, when activated, produce a number of chemoattractant growth factors that drive the migration of vascular smooth muscle and endothelial cells which in an important factor in the growth and development of blood vessels. We have also found that delivery of exogenous satellite cells can increase vascular recovery in murine model. More recently we have begun to explore the biology satellite cells in response to exercise, which is currently the most effective non-invasive treatment for PAD. The goals this work is harness the angiogenic properties of satellite cells through in vivo stimulation, therapeutically delivered cells, or more optimal exercise regimens.

Friday, April 30th
12:00 Noon

Seminar will be presented virtually via Zoom:
https://go.unc.edu/j5W3E