Department of
BIOENGINEERING
Clemson University

College of
AGRICULTURE, FORESTRY
AND LIFE SCIENCES

PAGE MORTON HUNTER DISTINGUISHED SEMINAR

CHRONIC UNPREDICTABLE STRESS CAUSES MITOCHONDRIAL DNA TO ACTIVATE INFLAMMASOMES LEADING TO HYPERTENSION

Hypertension is a chronic and multifactorial cardiovascular condition that contributes significantly to worldwide morbidity and mortality. Experimental and clinical data recognizes low-grade inflammation as a fundamental process in hypertension onset. In this context, inflammasome activation represents a key signaling platform that initiates hypertension-associated pathology. In particular, the nucleotide-binding domain, leucine-rich-containing (NLR) family pyrin domain containing 3 (NLRP3) and absent in melanoma 2 (AIM2) inflammasomes are complex platforms involved in the activation of caspase-1 and the maturation and release of interleukin (IL)-1β and IL-18. Patients with essential hypertension exhibit elevated levels of circulating IL-1β, and pharmacological inhibition of this inflammasome reduces blood pressure.

Neurogenic hypertension associated with chronic unpredictable stress (CUS) is the focus of current work. In this model, male and female mice (10wks of age) are subjected to CUS for 4 weeks which entails daily random stressors such as tilted cages, wet bedding, overnight light, and social stress. Systolic blood pressures measured increase in mice exposed to CUS. Further, gene expression levels of NLRP3 inflammasome, IL-1 , and IL-18 increase in cardiac tissue from mice exposed to CUS. These results are strong evidence that the NLRP3 inflammasome plays a critical mechanistic role in elevated blood pressure in this model of neurogenic hypertension.

Clinton Webb, Ph.D.

Professor
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Clinton Webb graduated from Southern Illinois University, in 1971, and received his Ph.D. in Anatomy from the University of Iowa in 1976. After postdoctoral training at the University of Michigan and the Universitaire Instelling Antwerpen, he joined the faculty of the Department of Physiology, University of Michigan in 1979, reaching full Professor in 1989. In 1999, he joined the faculty at the Medical College of Georgia as the Herbert S. Kupperman Chair in Cardiovascular Disease and Regents' Professor in the Department of Physiology.

In 2020, Webb was appointed Professor of Cell Biology and Anatomy and Director of the Cardiovascular Translational Research Center, University of South Carolina. He is a faculty member in the Department of Biomedical Engineering, College of Engineering and Computing with the title, South Carolina SmartState Endowed Chair in Biofabrication.

Research: The physiology of vascular smooth muscle, with emphasis on hypertension and sexual dysfunction.

March 14, 2024 • 3:30 p.m.

Location:

111 Rhodes Annex, Clemson University