



# RMB CVRC Seminar

The Robert M. Berne Cardiovascular Research Center Presents

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## **Astrocyte contribution to impaired vascular-to-neuronal signaling in disease conditions**

Unlike other organs, brain homeostasis requires constant cerebral blood flow (CBF). Impairments in blood flow delivery can overwhelm basic neuronal functions and accelerate neurodegenerative-related mechanisms leading to vascular cognitive impairment (VCI). Cardiovascular-related diseases are contributors to VCI. A common denominator in VCI is chronic hypoperfusion (CH) to the brain. However, the cellular mechanisms underlying progressive decline in neuronal function are complex and ill-defined. Hypoperfusion can result from conditions such as hypertension-related vascular remodeling, atherosclerosis and heart failure, to name a few. These risk factors, however, may target cells of the neurovascular unit to different degrees and/or at different time points during the disease. We previously reported that hemodynamic-related stimuli such as increases in flow and intravascular pressure increased astrocyte  $Ca^{2+}$  which in turn lowered resting pyramidal neuron firing activity, a process referred as vasculo-neuronal coupling (VNC)(2). We proposed VNC as a neuroprotective pathway that safeguards the brain from a mismatch in metabolic demand and supply (1, 2). Here, we hypothesize that vascular-related abnormalities impair flow of information at the neurovascular unit resulting in inefficient VNC. To address this hypothesis, we measured VNC using both a model of VCI and hypertension namely, bilateral common carotid artery stenosis (BCAS) and 28 day angiotensin II (Ang II) infusion in mice. I will present data on hypertension and CH-induced functional changes to the neurovascular unit. Specifically, I will address how these distinct conditions alter parenchymal arteriole vascular reactivity, astrocyte  $Ca^{2+}$  dynamics, and neuronal function..

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**Thursday February 21<sup>st</sup>, 2019**  
**11:00 AM-12:00 PM**  
**MR5 3005**

Hosted by: Swapnil Sonkusare, PhD  
Refreshments Served