

SCHOOL OF KINESIOLOGY

GUEST SPEAKER

(Co-sponsored by the Department of Zoology)

Dr. Jerome A. Dempsey, PhD

John Rankin Laboratory of Pulmonary Medicine, University of Wisconsin –
Madison, USA

“Contribution of Respiratory and Locomotor Muscle Afferents to the Cardio-Ventilatory Responses to Rhythmic Exercise in Humans”

When studied in isolation, stimulating muscle afferents clearly increases ventilation and sympathetic vasoconstriction – but their contribution remains uncertain when activated in a physiologic setting, i.e. in the presence of other powerful influences from central command and other reflex receptors. We and others have studied exercising canines and humans to determine that metaboreflexes from the diaphragm and expiratory muscles are activated in heavy exercise in health and during moderate exercise in disease states, thereby enhancing sympathetic vasoconstrictor outflow and affecting blood flow distribution between limb and respiratory muscles. These influences on oxygen transport exacerbate the rate of exercise-induced locomotor muscle fatigue and reduce exercise performance. A unique vasoreactivity of the diaphragm vasculature contributes importantly to these selective responses. Blockade of opiate-sensitive spinal afferents from the legs during all cycling intensities caused hypoventilation and reduced MAP and heart rate. Endurance exercise performance was also impaired primarily because of reduced O₂ transport. On the other hand, loss of feedback via afferents from fatiguing limbs also meant less inhibition of central locomotor command, resulting in a “choice” to continue exercise (or augment power output), thereby precipitating excessive peripheral fatigue. The relative importance of muscle afferents is likely altered in the presence of CHF and COPD, with aging, in hypoxic environments and with training. Our understanding of exactly which stimuli / conditions during rhythmic exercise activates these metaboreceptors remains incomplete, as does our knowledge of additional influences arising from interactive effects between feedback and feedforward mechanisms. Supported by NHLBI.

Tuesday February 14, 2012

12:30 – 2:00 PM

Michael Smith Laboratories, 2185 East Mall, Room 101

HOST: Dr. Bill Sheel

Dr. Dempsey is a world-renowned expert in physiology. Dr. Dempsey has supervised the training of over 60 pre- and post-doctoral fellows, and has published more than 300 peer-reviewed manuscripts. His major research interests include respiratory and cardio-respiratory physiology during sleep, exercise and hypoxia. He is the outgoing Editor-In-Chief of the Journal of Applied Physiology.