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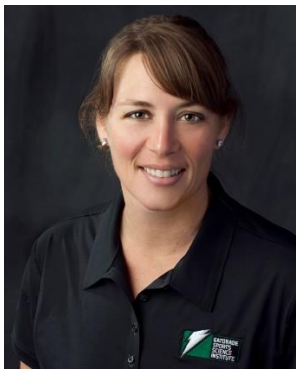
Presentation Summary

Exercise training provides physiologic benefits for both improving athletic performance and for maintaining good health across the lifespan. Though different exercise training strategies exist, two common exercise strategies are high-intensity interval training (HIIT) and moderate-intensity continuous exercise training (MCT). HIIT was developed early in the 20th century and later in that century popularized to improve Olympic athletic performance. The primary premise underlying HIIT is that when compared to energy expenditure-matched MCT, a greater amount of work is performed at a higher intensity during a single exercise session. This greater amount of work is achieved by alternating high-intensity work intervals with low-intensity work or rest intervals. Emerging scientific literature suggests that the HIIT training method does enhance athletic performance and can also provide additional health effects for patients having a chronic disease and should be included in their comprehensive medical management plan. Accordingly, a major consideration in developing an exercise prescription for nay individual including a chronic disease patient is the selection of an appropriate training strategy. The focus of this presentation is too briefly summary the use of HIIT to enhance the functional capacity of individuals in health and disease.

Brief Introduction Statement

Dr. J Larry Durstine is a Distinguished Professor in the Department of Exercise Science at the University of South Carolina. Before arriving at the University of South Carolina, Dr. Durstine earned his Ph.D. in Exercise Physiology/Biochemistry and Medical Physiology from the University of Toledo and The Medical College of Ohio at Toledo. He has published 93 referred scientific and review manuscripts and has written and edited nine professional books and nearly 40 book chapters. His primary research area is the evaluation of regularly practiced exercise and the impact of a single exercise session on blood lipid and lipoprotein concentrations. In addition, he has other research interest in evaluating the relationships between exercise and novel cardiovascular disease risk factors such as C-reactive protein and Lp(a). Additionally, Dr. Durstine has sought to understand the role of physical activity and exercise in the management of chronic disease. For most diseases daily physical activity or prescribed exercise will reduce disease risk while having a tremendous impact on primary and secondary disease prevention and treatment. Dr. Durstine has a strong commitment to daily exercise, has run competitively in high school and college, and continues today to exercise for “the health of it.

Kimberly Stein, PhD
Senior Principal Scientist Gatorade Sports Science Institute, Global Nutrition R+D



Fueling Athletes

Nutrition “advice” is everywhere and can be very confusing. Often what is seen is the popular media is aimed at individuals trying to lose weight or improve their overall health, and fad diets continue to come and go. Athletes also succumb to this type of diet advice; however, eating to fuel an athletic body for performance is very different and often contrary to the popular diets. This presentation will review the proper “diet” for an athlete looking to get the most out of their performance and recovery.

William Byrnes, PhD
Professor Department of Integrative Physiology at CU Boulder

Title: The importance of hemoglobin mass in defining hematological adaptations to exercise & altitude

Brief Summary:

Hemoglobin concentration can be measured accurately and has been used to describe the hematological adaptations to exercise and altitude. However, hemoglobin concentration is influenced by changes in both red cell volume and plasma volume. Since both of these volumes can change with exercise and altitude, it is impossible to distinguish red cell volume changes from plasma volume changes using hemoglobin concentration alone. The measurement of total hemoglobin mass allows researchers to separate out the changes in these two blood volume compartments. This talk will highlight the scientific merit of using hemoglobin mass rather than hemoglobin concentration to describe the hematological adaptations to exercise and altitude.

Brett Fling, Ph.D.
Assistant Professor, Health and Exercise Science, Molecular, Cellular and Integrative Neurosciences Program, Director, Sensorimotor Neuroimaging Laboratory

Title: Gait and balance: neural mechanisms and markers of neuroplasticity

Summary:
Although diagnostic assessment via clinical magnetic resonance imaging (MRI) has been in use for decades, only recently have advanced MR techniques been utilized in the research setting to investigate neural mechanisms underlying gait and balance control, to identify biomarkers for disease progression, and to assess therapeutic intervention efficacy. Functional MRI (fMRI) has been used extensively in a variety of stimulus-response paradigms to identify regions of task-specific neural activity. More recently, functional connectivity MRI (fcMRI) has revealed that the brain is very active even in the absence of explicit input or output. That is to say, spontaneous fluctuations in neural activity is not random noise, but is specifically organized in the resting human brain and serves as a potentially important and revealing manifestation of spontaneous neuronal activity providing insight into the intrinsic functional architecture and topography of the brain and potential physiological correlates of disease and mobility impairment. Finally, emerging literature is making use of diffusion weighted imaging within the MR environment to identify associations between white matter microstructural integrity and locomotor control. Combining functional MR approaches with diffusion imaging allows for a comprehensive assessment of neural structure and function.

While exciting advances have been made; the study of gait and balance with MR-based methods is clearly hampered by the inability to actually stand and/or move within the MRI environment, which would allow recording brain activity evoked by actual locomotion. To address this limitation, several MR-compatible approaches have been developed to provide indirect evidence of supraspinal involvement in locomotion. These approaches have identified brain activity patterns during imagined actions such as standing, walking, and running, as well as neural activity while actually performing voluntary or passive lower limb movements inside the scanner. The latter studies have incorporated diverse levels of complexity, from the evaluation of isolated, unilateral, and repetitive ankle and knee movements to more complex tasks that require coordinated movements of multiple joints reflective of stepping or pedaling actions.

This talk will provide insight into the structural and functional brain circuitry that underlie locomotor control identified via MR-based methodologies. In addition, I will discuss recent work detailing structural and functional neural mechanisms that are, at least in part, responsible for impairments in locomotor control that accompany healthy aging and select neurologic populations including multiple sclerosis and Parkinson's disease.

Jim Peterman

PhD student Department of Integrative Physiology at CU Boulder

Cycling is a great way to promote physical activity. It also happens to be a passion of mine. RMACSM grants have allowed me to study cycling and the success has followed.