Abstract ID 1497

Title
Energy Expenditure and Fuel Homeostasis During and After a Single Bout of Circuit Resistance Exercise in Persons with and without Spinal Cord Injury

Abstract
Objective: Determine if caloric (kcal) expenditure and fuel partitioning during/following a single bout of circuit resistance training (CRT) differ between persons with and without SCI.

Design/Method: 9 persons with paraplegia (PARA; 41±10 yrs; T3 T12), 5 persons with tetraplegia (TETRA; 39±12 yrs; C4 C7), and 9 neurologically intact persons (NI; 32±8 yrs) underwent ~50 min of CRT exercise (arm cycle ergometry interspersed between 6 resistance maneuvers 3 sets x 10 reps at 60% of 1 RM). Pulmonary gas exchange data collected before/during exercise, and up to 120 min post exercise, were used to calculate total energy expenditure, substrate preference, and rates of carbohydrate/fat oxidation. Data from the CRT session were compared with peak oxygen consumption (VO2PEAK) and peak heart rate (HRPEAK) derived from graded arm exercise testing and a non-exercise control condition (CON).

Results: CRT elicited similar rates of VO2PEAK and HRPEAK for all groups (50±14% and 77±14%, respectively). Total energy cost was predictably lower in TETRA (143±23 kcal) than PARA and NI (192±74 kcal and 201±35 kcal, respectively) despite having similar body mass. Post exercise VO2 was blunted in TETRA (2% above resting level) compared to PARA and NI (15 and 20%, respectively). Exercise energy production during exercise was overwhelmingly supported for all groups by equivalent, carbohydrate driven fuel utilization, but in the post exercise period favored fat metabolism. In sum, 312±24, 343±39 and 381±32 kcal, respectively, were expended by TETRA, PARA and NI in response to exercise and recovery.

Conclusion: When performed 3x weekly summed exercise and post exercise caloric expenditure for CRT is sufficient to satisfy exercise guidelines for both PARAs and TETRAs. Preferential post exercise metabolism of fatty fuels is influenced by injury level but lasts several hours, and significantly contributes to total energy expenditure of exercise.

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Objective 1. Analyze fuel use during and following exercise in persons with paraplegia and tetraplegia.

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Bio
Mark S. Nash, Ph.D., FACSM is a tenured Professor of Neurological Surgery and Rehabilitation Medicine at the University of Miami School of Medicine, Principal Investigator/Director of the Applied Physiology Research Laboratory for the Miami Project to Cure Paralysis, and Director
of Research for the Department of Rehabilitation Medicine. He is a Fellow of the American College of Sports Medicine. Dr. Nash has primary interests in assessment and treatment of cardiometabolic disease risks after SCI. He has published more than 100 peer review articles on these themes and related topics within rehabilitation physiology.

Dr. Nash has served on special interest panels and research advisory boards for the U.S. National Institutes of Health, Centers for Disease Control & Prevention, and National Institute for Disability and Rehabilitation Research (NIDRR). He is an Editorial Board Member for Topics in SCI Rehabilitation, current Chair of the ASIA Research and Awards Committee, and current Chair of the PVA Consortium for Spinal Cord Medicine Guideline Panel on Cardiometabolic Disorders. Dr. Nash is PI for a Department of Defense (DoD) multi-center trial examining diabetes prevention after SCI through lifestyle intervention, and Co PI on a DoD award examining sleep disorders and cognitive function after SCI. His other federal grants focus on exercise for obesity prevention after paraplegia and sleep disordered breathing and cardiometabolic disease risks after SCI. Dr. Nash was PI for the NIDRR funded multicenter trial examining Niaspan in Tetraplegia for which he received the 2012 ASIA David Apple award. He is currently Co PI for a NIDRR funded Multi Center RRTC on Secondary Conditions in SCI, Co-Director of the NIDRR funded South Florida SCI Model System, and PI for a recently awarded multi center NIDILRR Disability Rehabilitation Research Project.

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