IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Medical Care for Humans in Space (3)

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DOES SEX INFLUENCE CARDIOVASCULAR AND AUTONOMIC RESPONSES TO CENTRAL HYPOVOLEMIA?

Abstract

Introduction: Lower body negative pressure (LBNP) eliminates the impact of weight-bearing muscles on venous return, as well as the vestibular component of cardiovascular and autonomic responses. We evaluated the hemodynamic and autonomic responses to central hypovolemia, induced by lower body negative pressure (LBNP) in both men and women. Methods: A total of 44 participants, 21 males (25.48 3.9 years, 181.09 7.34 cm height, 75.09 9.30 kg weight) and 23 females (22.04 2.5 years,168.26 5.7 cm height, 58.30 6.83 kg weight) participated. During the experimental protocol, participants underwent three phases, which included 20 minutes of supine rest, four 5-minute intervals of stepwise increases in LBNP from -10 mmHg to -40mmHg, and 5 minutes of supine recovery. Throughout the protocol, continuously monitored hemodynamic variables such as blood pressure, heart rate, stroke index, and cardiac index. Autonomic variables were calculated from heart rate variability measures, using low and high frequency spectra, as indicators of sympathetic and parasympathetic activity, respectively. Results: During LBNP induced central hypovolemia in healthy participants, it was observed that: (a) resting hemodynamic and autonomic activity differ across the sexes; and (b) sex influences hemodynamic and autonomic responses during the caudal-fluid shift induced by LBNP. Conclusions and future directions: Resting hemodynamic and autonomic parameters at rest are influenced by sex. Effect of LBNP was different for both the sexes, which could potentially be attributed to the lower sympathetic activity in females. Sex-steroid hormones appear to play important roles also in the cardiovascular reactivity to the caudal-fluid shift induced by LBNP. Future studies should examine to what extent the menstrual phase influences resting hemodynamic and autonomic functions as well as the potential role different types of oral contraceptives play in the cardiovascular and autonomic reactivity during central hypovolemia. With increasing number of female crew members in manned space missions, it is important to understand the role sex-steroid hormones play in the regulation of cardiovascular and autonomic activity, at rest and during LBNP.