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Human Physiology in Space (2)

Author: Dr. Nandu Goswami
Medical University of Graz, Austria, nandu.goswami@medunigraz.at

Dr. Marie-Pierre Bareille
MEDES - IMPS, France, marie-pierre.bareille@medes.fr
Dr. Arnaud Beck
France, arnaud.beck@medes.fr
Prof. Helmut Hinghofer-Szalkay
Austria, helmut.hinghofer@medunigraz.at
Dr. Andrew Blaber
Canada, ablaber@sfu.ca

EFFECTS OF HYPERGRAVITY ON CARDIO-POSTRUAL INTERACTIONS AND CEREBRAL AUTOREGULATION IN MALES AND FEMALES

Abstract

Orthostatic intolerance remains a problem upon return to Earth from the microgravity environment of spaceflight. A variety of conditions including hypovolemia, cerebral vasoconstriction, cerebral or peripheral vascular disease, or cardiac arrhythmias may result in syncope if the person remains upright. Current research indicates that there is a greater dependence on visual and somatosensory information at the beginning of space flight with a decreased otolith gain during prolonged space flight (Herault et al., 2002). The goal of the research is to further our understanding of the fundamental adaptive homeostatic mechanisms involved in gravity related changes in cardiovascular and postural function. Cardiovascular, cerebrovascular, and postural sensory motor control systems in male and female participants before, during, and after exposure to graded levels of hyper-G were investigated. Hypotheses: 1) Activation of skeletal muscle pump will be directly related to the degree of orthostatic stress. 2) Simultaneous measurement of heart rate, blood pressure and postural sway will predict cardio-postural stability. Blood pressure and heart rate (means and variability), postural sway, center of pressure (COP), baroreflex function, calf blood flow, middle cerebral artery blood flow, non-invasive intracranial pressure measurements, and two-breath CO2 were measured. Results from the study will be used to provide an integrated insight into mechanisms of cardio-postural control and cerebral autoregulation, which are important aspects of human health in flights to Moon, Mars and distant planets.