Paper ID: 58184
student

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Human Physiology in Space (2)

Author: Dr. Chrysoula Kourtidou-Papadeli
Greek Aerospace Medical Association, Greece, papadc@otenet.gr

Ms. Aliki Karkala
Greek Aerospace Medical Association, Greece, akarkala@auth.gr
Mr. Agisilaos Krachtis
Aristotle Uiniversity of Thessaloniki, Greece, agiskrachtis@gmail.com
Dr. Christos Frantzidi
Aristotle Uiniversity of Thessaloniki, Greece, christos.frantzidis@gmail.com
Prof.Dr. Felice Strollo
Italy, felix.strollo@gmail.com

EFFECTS OF SIMULATED MICROGRAVITY IN ARTERIAL STIFFNESS AND EFFECTIVENESS OF REACTIVE SLEDGE JUMPS AS A COUNTERMEASURE

Abstract

Experiments during space flight and simulated microgravity (-6 Head-down tilt bedrest) demonstrate that a lot of physiological and biochemical changes occur as part of the process of physiological adaptation. These include blood displacements (chest and head), reduced plasma volume, increased heart rate and venous compliance, decreased central venous pressure and impaired autonomic reflex functions. Changes in arterial stiffness play an important role in terrestrial based cardiovascular pathologies and may make significant contributions to microgravity induced cardiovascular pathologies. Therefore, the purpose of the present study was to determine whether long term head down tilt bedrest (LTBR) induces changes in arterial stiffness and to evaluate the effectiveness of a high intensity Reactive Sledge jumps training (RSL) as a countermeasure.

The experimental phase of the RSL study was funded by the European Space Agency (ESA) and the project took place in the premises (ENVIHAB) of the German Aerospace Agency (DLR) in Cologne, Germany. Participants enrolled to the study were 23 healthy, male volunteers aged between 20 and 45 years, subjected to LTBR and randomly assigned either to a control (12) or to a training sledge (11) group using RSL 3-4 times per week, as a countermeasure activity. Arterial hardening was recorded 2 weeks before the bed rest initialization (Baseline Data Collection, BDC-14 phase), 21, 35, and 50 days after the experiment began (Head Down Tilt, HDT-21, 35, 50 phases) and finally 7 days after the end of the bed rest period (Recovery phase). The measured values were Systolic and Diastolic Blood Pressure, Heart rate and value H: the user's arterial elasticity right after measuring blood pressure. In addition, two weeks before and after the bed rest phase, participants were confined to the bed rest facility for familiarization, measurements and recovery.

Results showed a significant main effect of day of measurement [F (7, 105)= 4.082, p= .001, = .214], measurement type (average Systolic Pressure, average Diastolic Pressure, average Number of Pulses) [F (2, 30)= 620.256, p¡ .00001, = .976] and a significant interaction between day of measurement and training group [F (7, 128)= 2.112, p= .048, = .123]. All three measurement type recordings were significantly lower in day 35 in the training group compared to the other measurements. Overall, arterial stiffness increased the longer the time in LTBR and the countermeasure has been effective. The correlation with stress hormones is still under processing.