

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

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THE EFFECT OF MENTAL STRESSORS ON THE CARDIOVASCULAR SYSTEM IN VARIOUS
GRAVITATIONAL ENVIRONMENTS**Abstract**

When an astronaut transitions from a low to high gravitational environment, fluid shifts from the head towards the feet results in orthostatic intolerance, leading to syncope. Ground based experiments have shown that by stimulating the cardiovascular system via simple mental stressors, syncope can be delayed, potentially enabling astronauts to reach assistance before loss of consciousness. However, the effect of mental stressors on the stimulation of the cardiovascular system is unknown in gravitational environments different than that of Earth's. As such, this paper investigates the effects that mental stressors have under various gravitational environments. To do this, a pilot study was performed in which two participants were flown on two separate parabolic flights that simulated hyper and hypogravity conditions. The plane used was an Aerobatic Single-Engine Cap-10B plane (twin seater), and each participant executed 11 parabolas. The participants were the winners of the Barcelona Zero-G Challenge 2011 organized by UPC Barcelona Tech and Aeroclub Barcelona-Sabadell. Measurements were made of the participants' hemodynamic and autonomic response throughout the parabolas. Comparisons of the baseline response without mental stressors, and the response with mental stressors were made. From this it was concluded that mental stressors increase the heart rate both in a hyper and hypogravity environment as compared with the baseline case with no mental stressors.