

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

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STRESS AND IMMUNE CHANGES DURING 5 DAYS OF SHORT TERM BED REST IN -6
DEGREES HEAD DOWN TILT AND ARTIFICIAL GRAVITY INTERVENTIONS**Abstract**

Background: Bed rest in -6 degrees head down tilt position is an adequate analogue to monitor distinct physiological alterations seen also during G conditions in space. We investigated in short term bed rest (5 days STBR) the effects of intermediate application of 2 artificial gravity (AG) protocols on stress and immune responses.

Goals: *The study was designed i) to determine emotional stress and innate immune functions related to bed rest per se ii) to analyze the effects of two different, daily AG regimen.*

Methods: In a crossover design 12 healthy males (32.6±7.1years) were assigned to 3 protocols with no centrifugation, one daily centrifugation session (1G -in-the-center-of-mass) either in one go for 30min (AG1) or in interrupted runs of 6x5min (AG2). Stress questionnaires were performed. Several biological stress markers, differential blood-cell-count, innate immune functions and the cellular responsiveness to re-call antigens were determined.

Results: No significant emotional stress was observed during bedrest alone. Centrifugation was initially perceived as a stressful event; however, the AG2 protocol provoked less activation than AG1. Stress habituation in AG2 was quantified by lack of saliva cortisol increase on HDT4 as compared to HDT1 (HDT+1: 0.17±0.1 vs. 0.40±0.2; p=0.004; HDT4: 0.20±0.10 vs. 0.25±0.16 g/dl; n.s.). Haemoglobin increased in all subjects during HDT (14.7±1.00 vs. 16.0±0.96 g/dl; p<0.001). Leukocyte counts slightly increased due to a higher fraction of polymorphonuclear leukocytes (PMN; n.s.) which showed activation as assessed by higher shedding of CD62L during HDT in all study arms (BDC vs. HDT3: 54.99±8.67 vs. 25.36±2.75; RFU, p<0.001) while the ex vivo activation pattern and H2O2 production of PMN remained unaffected. The percentage of CD8+ and CD56/16/3+ natural-killer-T-cells augmented. Lymphocyte function-associated antigen-1 (LFA-1/CD11a) on T-cells showed a tendency to increase during HDT and

the AG2 regimen.

Conclusion: Short term bed rest leads to very moderate stress, but significant enumerative haematological changes and distinct effects on innate and adaptive human cell functions. Stress perception and responses were higher and persistent in the AG1 group.

Acknowledgement: This investigation has been supported by the European Space Agency (ESA), MEDES (Toulouse, France) and the German National Space Program (50WB0719/WB0919).