PERIODIC UPRIGHT POSTURE NEGATES THE SUPPRESSION OF NEUROENDOCRINE RESPONSE TO HEAD DOWN BEDREST. C. E. Wade, J. Vernikos, J.J. Evans, and D. O'Hara. Life Science Division, NASA Ames Research Center, Moffett Field, CA 94035.

INTRODUCTION. Head down bedrest (HDT) decreases plasma neurohormone levels, probably retaining a nadir within four hours after HDT. This study evaluated the effects of periodic standing or exercise (+Gz) on this acute suppression of plasma neurohormones. METHODS. Eight male subjects (mean(SE) age 37±2 yr; height 198.2±2 cm; weight 86.3±2 kg) were admitted to the NASA-KSC, Kennedy Space Center, FL, and were divided into 4 groups of 2 (G1 and G2) who received 4 different +Gz exposure protocols (+Gz, +Gz1, +Gz2, and +Gz3) for 5 days with single +Gz exposures occurring separated by one day. Subjects were assigned to head down tilt (6°) or 10° head up standing or moderate exercise. Plasma aldosterone, plasma renin activity (PRA), cortisol, NE and E levels were measured.

RESULTS. Control levels following 45-min supine were not different between treatments. HDT decreased plasma aldosterone (193.7±7 to 64.6±7 ng/dl) and NE levels (293±35 to 217±43 pg/ml). Plasma vasopressin (1.1±0.5 to 1.1±0.5 pg/ml), cortisol (11.1±1.4 to 9.3±1.5 ng/ml), E (69±15 to 65±21 pg/ml), and PRA (219±50 to 185±40) were not significantly different. Standing or exercise negated the decrease in aldosterone and NE levels due to HDT exposure.

CONCLUSIONS. Periodic upright posture (+Gz) with or without exercise for 15 minutes each hour negates the acute suppression of aldosterone and NE associated with HDT.


INTRODUCTION. What is the most efficient dosage and frequency of periodic exposures to +Gz during missions to maintain a physiological upright posture after returning to a +Gz environment? The answer has implications for the type of countermeasures astronauts will be required to perform during extended space flight.

METHODS. Nine males were subjected to four different +Gz exposure protocols plus a control protocol (0Gz) during four days of continuous bedrest. The four +Gz exposures consisted of a standing period of 30 minutes or less with 45 minutes of ambulatory standing each day for a total period of two or four hours. Each subject was returned for bedfast survival on five different occasions over a period of approximately one year to obtain data on each of the nine subjects across all four +Gz treatments and the control. A 30min tilt test was used to measure orthostatic response during pre and post bedfast survival. RESULTS. In terms of the plasma aldosterone levels, the +Gz exposures at 1Gz and 2Gz were not different. However, the +Gz exposures at 3Gz and 4Gz were significantly lower. A 4Gz period of 30 minutes or less with 45 minutes of standing resulted in a significant decrease in plasma aldosterone levels. CONCLUSIONS. The results will need to be evaluated with regards to a variety of other physiological systems which are known to decondition during microgravity.