HYPERREACTIVITY AND ATOPY. OF the 179 subjects who had a positive cold provocation test, 89.7% were allergic to Phadiatop (positive serum IgE). The results are shown in Table 1. The prevalence of both hyperreactivity and atopy was significantly higher in the young IAF than in the general population.

METHODS. 90 healthy males (17-24 yrs) were evaluated and followed in the Institute of Aerospace Medicine and "EN" Clinic, University of Rome.

INTRODUCTION. Nasal function is of paramount importance for aircrew. Aspecific nasal hyperreactivity (ANH) prevalence in a young IAF population was investigated and compared to the prevalence of specific bronchial hyperreactivity (ABH) and ABH who had been studied for a year in the same IAF. Allergic hyperreactivity is defined as an administered cold water and methacholine nasal provocation test (NPT). ANH was evaluated by rhinomanometry, and only for the same NPT, by measurement of nasal secretions. A methacholine bronchial provocation test (BPT) was also performed, as well as a screening test for inhalant allergy (Phadiatop). RESULTS. 25% was positive to cold water NPT, 35% to methacholine NPT and 8% to BPT. ANH was present in 2/3 of the ABH with NPT. ANH was associated with ABH to either NPTs. 24% was positive to Phadiatop and 91% in this group was positive to either NPT or BPT. CONCLUSION. ANH is more frequent than ABH, which is often associated to the former condition. Atopy seems to match very often with ANH and/or other airway hyperreactivity implications for selection of aircrew can follow.


BLOOD VOLUME AND ORTHOSTATIC RESPONSES OF MEN AND WOMEN TO A 13-DAY BEDREST. *S. Forney, T. Driscoll, L. Dussault, L. Stahl, A. Cahoon, E. Johnson Space Center, KRUG Life Sciences, and the Baylor College of Medicine.

INTRODUCTION. Changes in blood volume during space flight are thought to contribute to decrements in functional and orthostatic function. The purpose of this study was to determine whether gender affects red cell mass and plasma volume during a short exposure to simulated microgravity, and whether gender differences in orthostatic responses during control conditions are present. METHOD. Subjects (13±5.2 yrs, STD) underwent 13 days of 6° head-down bedrest. Plasma volume (Hb-bound) and red cell mass (Hb-bound red blood cells) were measured before bedrest and on bedrest day 13. On the same days, orthostatic tolerance (OTT) was determined as the maximum pressure during a presyncopal-limited lower body negative pressure test. RESULTS. Plasma volume (Pv) and red cell mass were similar (1.7±0.2 ml/kg in men and 1.7±0.2 ml/kg in women). OTT was similar for men and women before bedrest (-78±2.6 mmHg in men vs. -70±4.9 mmHg in women) and decreased by a similar degree (by an average of 11 mmHg in both groups) after bedrest. The changes in OTT did not correlate with changes in plasma volume during bedrest (P = 0.02).

CONCLUSION. Thus, although female hormones may protect PV during bedrest, they do not appear to offer an advantage in terms of loss of orthostatic function.

EFFECT OF ANTIORTHOSTATIC BEDREST (BR) ON GASTROINTESTINAL MUCOSAL BLOOD FLOW IN NORMAL SUBJECTS. *E. Patchett*, N. Hunter*, J.J. Tarpley, and N.M. Cintora*. NASA Johnson Space Center, Houston, TX, and the College of Pharmacy and Science, Philadelphia, PA.

INTRODUCTION. The combined effect of reduced fluid shifts, fluid losses, and diuresis associated with the absence of the gravity vector may decrease GIM during space flight. GIM can be estimated from the mouth-to-cecum transit time (MCTT) of orally administered lactulose (LAC), this test is used to assess changes in gastrointestinal transit and in gastrointestinal transit and digestion. Since BR mimics some of the physiological changes that occur during space flight, the effect of 10 days of BR on GIM was evaluated from the MCTT of LAC. METHOD. Subjects were 12 normal volunteers between the ages of 35 and 50. After an 8-10 h fast, subjects ingested Cephalin® (20g solution) with a low-fiber breakfast on four different days (45, 30, 25, and 20) before and on three separate days (4, 7, and 10) during BR. Breath-H2 concentrations were measured before and at 10 min intervals for 4 h after breakfast using a Quintron breathalyzer. MCTT was determined from these data. RESULTS. MCTT ranged between 50 and 100 min during ambulation and 80 and 210 min during BR with means of 79 min and 122 min, respectively. CONCLUSIONS. Mean MCTT during BR was 54% longer than during ambulation, suggesting that absorption and availability of orally administered medications and nutrients may be delayed or impaired as a result of decreased GIM during bedrest.

THE EFFECTS OF LYPSERIN ON HEMODYNAMIC RESPONSES TO HEAD- TILT AND ORTHOSTATIC STRESS. D.E. Ward and R.W. Goetzl*. Wright State University School of Medicine, Dayton, OH 45401.

INTRODUCTION. This study was conducted to determine the effects of the synthetic drug lysine-Vasopressin (lyepsyn) on specific hemodynamic variables during nacson (4 hours) head-down tilt (HDT) and subsequent orthostatic stress. METHOD. Seven healthy male subjects, ages 23-35 yrs, were studied in a blinded, cross-over study of lysypsin versus the control, normal saline intragastric admistration. Subjects were studied intragastrically immediately before and two hours after beginning a 6 degree head-down tilt. Plasma volume, urine flow and cardiovascular dynamics were determined as previously published and compared to data collected simultaneously with GIM monitoring. RESULTS. Mean MCTT during BR was 54% longer than during ambulation, suggesting that absorption and availability of orally administered medications and nutrients may be delayed or impaired as a result of decreased GIM during bedrest.

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DOBUTAMINE, A BETA AGONIST, REDUCES MUSCLE AND BONE LOSS IN DENERVATED HINDLIMBS. M.L. Walker, K. Prater, B. Hertz, S. Whittenberger and B. Gnatz. Wright State University, Ohio, USA. 45455

INTRODUCTION. Hindlimb denervation produces alterations in skeletal muscle and bone similar to those observed in animals exposed to microgravity. The objective of this experiment was to determine the effects of dobutamine, a beta agonist, on skeletal muscle and bone.

METHODS. Adult male Sprague-Dawley rats (n=14) underwent unilateral sciatic nerve transection on the right hindlimb. After surgery rats were randomly assigned to either control saline (SAL) or dobutamine (DOB) treatment groups. Each animal received two intraperitoneal injections per day, given approximately one hour apart, for 11 of the 12 days. Bone and muscle samples from the proximal and distal parts of the tibia from both the innervated (INN) and denervated (DENERV) hindlimbs of each rat were measured by a bone densitometer (SP-2 Lunar). Muscle weights of the soleus (SOL) and plantaris (PLT) and citrate synthase (CS) enzyme levels of the SOL muscle were examined.

RESULTS. ANOVA and Tukey's post hoc tests (p<0.05) indicated a significant reduction in wet weight of the SOL and PLT muscles in the DENERV SAL group when compared with their INNERV counterparts. BMC of the PT and FS of the tibia and CS levels of the SOL were also significantly reduced in the DENERV animals that received SAL. Although animals which received DOB treatment did have decreases in muscle mass, BMC and CS in the DENERV hindlimb, these decreases were not significant when tested against their INNERV values. DOB treatment appeared to be most effective in bone, where the decrease in BMC produced by DENERV in SAL animals was almost entirely eliminated in rats receiving the drug. CONCLUSION. These data indicate that DOB is able to effectively attenuate alterations in muscle and bone which are induced by hindlimb denervation. This information suggests that DOB may be effective as a countermeasure for some of the deconditioning-like changes which result from exposure to a microgravity environment.

CHANGES IN LEFT VENTRICULAR FUNCTION AS DETERMINED BY THE MULTI-WIRE GAMA CAMERA AT PRE-ERUPTIVE LEVELS OF LOWER BODY NEGATIVE PRESSURE.

R. Piñeiro, S. Fortes, S. Mukherji, J. Lacy, KRUG Life Sciences, NASA Johnson Space Center, USA; *University of Texas Space Research Association and Baylor College of Medicine.

At pre-eruptive levels of lower body negative pressure (LBNP), we have frequently observed elevations in right atrial pressure that were associated with decreases in right atrial pressure. To further investigate this, we evaluated cardiac function using a nuclear imaging technique in 21 healthy subjects (17 men and 4 women) after 30 minutes of imaging technique. Between rest and injection, cardiac position and/or shape, but could be indicative of altered myocardial function. To further investigate this, we evaluated cardiac function using a nuclear imaging technique in 21 healthy subjects (17 men and 4 women) after 30 minutes of imaging technique in 21 healthy subjects (17 men and 4 women) after 30 minutes of injection. Cardiac first pass images were obtained from measurement of ear and eye-level perfusion indices. The mean difference in the opacity levels of the 2 min exposure, ear opacity and eye-level blood flow at heart and head level are known to increase and decrease with regular frequency (Wood and Lambert, 1989). If so, Gz tolerance capacity may vary during this time. METHODS. Continuous head-level perfusion indices were obtained from measurement of ear and eye-level blood flows at heart and head level were known to increase and decrease with regular frequency (Wood and Lambert, 1989). If so, Gz tolerance capacity may vary during this time. RESULTS. Mean blood flow velocity (MBFV) was significantly decreased during G-onset (64.5 ± 5.0 vs. 0.5 ± 0.5), but also tolerated greater levels (p<0.05) of negative pressure (88 ± 7 ram Hg at injection). Cardiac first pass images were obtained using a Multi-Wire Gamma Camera following an intravenous bolus injection of 30-50 MBFV. ARTERY. Aorta, femoral, brachial, and carotid arteries were assessed by transcranial Doppler recording of middle cerebral artery (MCA) blood flow velocity. Arterial pressure (heart rate) was monitored with a continuous non-invasive method (Finapres 3300). From these data, mean cerebral artery perfusion pressure was computed. RESULTS. Mean blood flow velocity (MBFV) was significantly decreased during G-onset and during 2 and 4 Gz plateaus. MBFV + S.E.M. decreased from 11.5 ± 5.2 % (2 Gz) to 44.5 ± 24 % (5 Gz). Three main intervals were cases were there was no significant extended blood flow back in MCA. DISCUSSION. The sensitivity of TCD method is adequate to evaluate small variations of CBF at 2Gz. The method shows that CBF is insufficient at certain 5 Gz profiles, explaining intolerance symptoms.

ASSOCIATION OF CEREBRAL BLOOD FLOW BY TRANSRANSMISSIONAL DOPPLER METHOD DURING +Gz ACCELERATION IN HUMAN. G. OSSARD, J.-M. CLERB, F. MELCHIOR, A. RONCIN, J. SEYLAZ. Laboratoire de Medecine Aerospatiale, Centre d'Essais en Vol, PN1928 Brittany on Cape Codex, France.

INTRODUCTION. Limit of human tolerance to +Gz acceleration is attributed to cerebral perfusion failure. A study using transcranial Doppler (TCD) was conducted in order to evaluate cerebral blood flow in +Gz. The study was conducted in the Mayo Centrifuge Laboratory in the 40s. 7 relaxed subjects were exposed to +Gz at a rate of 10/s. +Gz increased in successive 0.5 +Gz increments beginning at +2 Gz at visual blackout. RESULTS. In the first 5 s of +Gz exposure, eye opacity and ear opacity pulse amplitude decreased. The decrease was more marked at increased +Gz levels. Cardiovascular compensation occurred over the next 5 s which increased opacity and pulse rate. For the remainder of the 30 min exposure, ear and eye opacity pulse amplitude decreased with a mean cycling period of 10.4 s. The mean difference in the opacity levels within cycles was 17.1% of the +1 Gz opacity value. CONCLUSIONS. These results suggest a tissue sensitivity to +Gz which is reduced by cardiovascular state-then. The study was conducted in the Mayo Centrifuge Laboratory in the 40s. 7 relaxed subjects were exposed to +Gz at a rate of 10/s. +Gz increased in successive 0.5 +Gz increments beginning at +2 Gz at visual blackout. RESULTS. In the first 5 s of +Gz exposure, eye opacity and ear opacity pulse amplitude decreased. The decrease was more marked at increased +Gz levels. Cardiovascular compensation occurred over the next 5 s which increased opacity and pulse rate. For the remainder of the 30 min exposure, ear and eye opacity pulse amplitude decreased with a mean cycling period of 10.4 s. The mean difference in the opacity levels within cycles was 17.1% of the +1 Gz opacity value. CONCLUSIONS. These results suggest a tissue sensitivity to +Gz which is reduced by cardiovascular state-then. The study was conducted in the Mayo Centrifuge Laboratory in the 40s. 7 relaxed subjects were exposed to +Gz at a rate of 10/s. +Gz increased in successive 0.5 +Gz increments beginning at +2 Gz at visual blackout. RESULTS. In the first 5 s of +Gz exposure, eye opacity and ear opacity pulse amplitude decreased. The decrease was more marked at increased +Gz levels. Cardiovascular compensation occurred over the next 5 s which increased opacity and pulse rate. For the remainder of the 30 min exposure, ear and eye opacity pulse amplitude decreased with a mean cycling period of 10.4 s. The mean difference in the opacity levels within cycles was 17.1% of the +1 Gz opacity value. CONCLUSIONS. These results suggest a tissue sensitivity to +Gz which is reduced by cardiovascular state-then. The study was conducted in the Mayo Centrifuge Laboratory in the 40s. 7 relaxed subjects were exposed to +Gz at a rate of 10/s. +Gz increased in successive 0.5 +Gz increments beginning at +2 Gz at visual blackout. RESULTS. In the first 5 s of +Gz exposure, eye opacity and ear opacity pulse amplitude decreased. The decrease was more marked at increased +Gz levels. Cardiovascular compensation occurred over the next 5 s which increased opacity and pulse rate. For the remainder of the 30 min exposure, ear and eye opacity pulse amplitude decreased with a mean cycling period of 10.4 s. The mean difference in the opacity levels within cycles was 17.1% of the +1 Gz opacity value. CONCLUSIONS. These results suggest a tissue sensitivity to +Gz which is reduced by cardiovascular state-then. The study was conducted in the Mayo Centrifuge Laboratory in the 40s. 7 relaxed subjects were exposed to +Gz at a rate of 10/s. +Gz increased in successive 0.5 +Gz increments beginning at +2 Gz at visual blackout. RESULTS. In the first 5 s of +Gz exposure, eye opacity and ear opacity pulse amplitude decreased. The decrease was more marked at increased +Gz levels. Cardiovascular compensation occurred over the next 5 s which increased opacity and pulse rate. For the remainder of the 30 min exposure, ear and eye opacity pulse amplitude decreased with a mean cycling period of 10.4 s. The mean difference in the opacity levels within cycles was 17.1% of the +1 Gz opacity value. CONCLUSIONS. These results suggest a tissue sensitivity to +Gz which is reduced by cardiovascular state-then.