BLOOD VOLUME AND ORTHOSTATIC RESPONSES OF MEN AND WOMEN TO A 13-DAY BEDREST. *S. Forney, T. Driscoll, L. Haseltine.* NASA 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 postural 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 tolerance (OT) during ground-based bedrest are preserved. METHODS. Twenty-eight men (29 ± 5.2 yrs, STD) and eleven normally-menstruating women (33.6 ± 6.0 yrs, STD) underwent 13 days of 6° head-down bedrest. Plasma volume (%Phadial; albumin) and red cell mass (%Phadial; red blood cells) were measured before bedrest and on bedrest day 13. On the same day, orthostatic tolerance (OT) was determined as the maximum pressure during a presyncopal-limited lower body negative pressure test. RESULTS. Plasma volume (PVT) and red cell mass (RCM) decreased (P < 0.01) during bedrest in both groups, with a greater PVT decrease in men (6.3 ± 0.6 ml/kg) than in women (4.1 ± 0.6 ml/kg). Decreases in red cell mass were similar (1.7 ± 0.2 ml/kg in men and 1.7 ± 0.2 ml/kg in women). OT was similar for men and women before bedrest (-78.6 ± 2.6 mmHg in men vs. -70.4 ± 2.6 mmHg in women) and decreased by a similar degree (by an average of 11 mmHg in both groups) after bedrest. The changes in OT did not correlate with changes in plasma volume during bedrest (P = 0.02).

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

THE EFFECTS OF LYPRESSIN ON HEMODYNAMIC RESPONSES TO HEAD-DOWN TILT AND ORTHOSTATIC STRESS. D. Wight* and R.W. Griswold.* Wright State University School of Medicine, Dayton, OH 45401.

INTRODUCTION. This study was conducted to determine the effects of the synthetic drug lysine-vasopressin (lypressin) on specific hemodynamic variables during nac sons (4 hours) head-down tilt (HDT) and subsequent orthostatic stress. METHODS. Seven healthy male subjects, ages 23-34, who were in good health, were blinded, cross-over study of lypressin versus the control, normal saline nasal spray, administered intranasally immediately before and two hours after beginning a 6 degrees head-down tilt. Plasma volume changes, and cardiac output and cardiovascular dynamics were measured with venous hemoglobin/hematocrit (Hct) and cardiac output, x-ray densitometry, impedance cardiography, plethysmography measurements before, during, after tilt, and in response to a 20 minute stand test. RESULTS. In the lypressin trial, stroke volume, cardiac output and index of basal impedance, and pulse pressure were significantly decreased (P < 0.05) while total peripheral resistance was increased at the end of tilt. Plasma volume changes showed a significant increase of 5.9% by the end of tilt in the lypressin trial (P < 0.001). During the control trial, there was no significant change. Clinical observations included pre-syncopal symptoms in three of the seven control subjects versus none of the lypressin trial subjects during post-tilt standing test. Post-tilt hypotenation and peripheral arterial pressure was maintained at a higher value in the lypressin trial compared to baseline stand test. The pulse time index and cardiovascular index of conditionning showed a significant increase for placebo subjects after tilt and a significant decrease from pre-tilt with lypressin subjects. CONCLUSIONS. The cardiovascular system adapts to a new steady-state during 4 hours HDT that is maladaptive when provoked with orthostatic stresses. Exogenous vasopressin analogue ameliorates the deleterious effects of post-tilt standing test by maintaining the intravascular volume at greater than pre-tilt values and increasing mean arterial pressure via peripheral resistance.