**ABSTRACT**

Sustainability of healthy astronauts to orthostatic hypotension and presyncope is exacerbated upon return from spaceflight. Hypovolemia is suspected to play an important role in cardiovascular deconditioning following exposure to spaceflight, which may lead to increased peripheral resistance, attenuated arterial baroreflex, and changes in cardiac function. The effect of altered gravity during spaceflight and planetary transition on human cardiovascular function is of critical importance to maintenance of astronaut health and safety. A promising countermeasure for post-flight orthostatic intolerance is fluid loading used to restore lost fluid volume by giving crew salt tablets and water prior to re-entry. Eight men and eight women will be tested during two, 6-hour exposures to 6° Head Down Tilt (HDT): 1) fluid loading, 2) no fluid loading. Subjects will be instructed to limit their dietary salt intake to 2300 mg per day for 3 days before each HDT session. There will be a 7-day interval between each session and the test order will be counterbalanced. Subjects will be tested between 8AM and 4PM. The standard fluid loading protocol used with astronauts will be followed for this study (see table below).

**PROCEDURE**

1. 10-minute sitting baseline; 2) 3-minute stand test to assess orthostatic tolerance; 3) begin 6-hour exposure to 6° HDT; 4) To the calculated amount of fluid and salt will be ingested in 4 equal portions every 15 min over the first 1-hour period; 5) and 6° HDT after 6-hours; 6) 3-minute stand test to assess changes in orthostatic tolerance. Urine sodium intake will be measured before and after each HDT test. Subjects will not be permitted to use the rest room during HDT sessions. External latex catheters will be provided for men and disposable diapers for women.

**MATERIALS**

Echocardiography measures (stroke volume and cardiac output) will be obtained during pretest sitting baseline, each stand test, and at 30 minute intervals over the 6-hours of HDT. Each cardiac scan will be 1-minute in duration. Stroke volume is calculated as the product of the aortic cross-sectional area and the velocity time integral of Doppler flow. Velocity time integral will be obtained using pulse Doppler of ascending aorta velocity at the suprasternal notch.

**CONCLUSIONS**

These preliminary data (n=4) show large individual differences in cardiac responses to HDT and the fluid loading countermeasure. Significant correlations were observed between impedance and echocardiography measures of cardiac output during 6° fluid and fluid HDT conditions (n=1). Stroke volume was also significantly correlated for the two measures but only during the no fluid condition. This research is ongoing.

**REFERENCES**