Gender differences in bed rest: preliminary analysis of vascular function
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Orthostatic intolerance is a recognized consequence of spaceflight. Numerous studies have shown that women are more susceptible to orthostatic intolerance following spaceflight as well as bed rest, the most commonly used ground-based analog for spaceflight. One of the possible mechanisms proposed to account for this is a difference in vascular responsiveness between genders. We hypothesized that women and men would have differing vascular responses to 90 days of 6-degree head down tilt bed rest. Additionally, we hypothesized that vessels in the upper and lower body would respond differently, as has been shown in the animal literature. Thirteen subjects were placed in bedrest for 90 days (8 men, 5 women) at the Flight Analogs Unit, UTMB. Direct arterial and venous measurements were made with ultrasound to evaluate changes in vascular structure and function. Arterial function was assessed, in the arm and leg, during a reactive hyperemia protocol and during sublingual nitroglycerin administration to gauge the contributions of endothelial dependent and independent dilator function respectively. Venous function was assessed in dorsal hand and foot veins during the administration of pharmaceuticals to assess constrictor and dilator function. Both gender and day effects are seen in arterial dilator function to reactive hyperemia, but none are seen with nitroglycerin. There are also differences in the wall thickness in the arm vs the leg during bed rest, which return toward pre-bed rest levels by day 90. More subjects are required, especially females as there is not sufficient power to properly analyze venous function. Day 90 data are most underpowered.
Orthostatic intolerance is a recognized consequence of spaceflight. Numerous studies have shown that women are more susceptible to orthostatic intolerance following spaceflight as well as bed rest, the most widely used model of microgravity. There is evidence of reduced arterial and venous responses to pharmacological agents during bed rest. We also tested the hypothesis that arteries in the arm and leg would remodel during bed rest. Additionally, we tested the hypothesis that arteries would remodel during bed rest. We do not have sufficient statistical power to detect any changes in venous function. Twelve more females and 9 more males will be studied.

Limitations:
A major limitation for this study is the subject number at the varying time points. This is largely due to the forest evacuation of subjects for Hurricane Rita. Those subjects, therefore, only completed 44-43 days of the designed 90 day bed rest protocol. Thus, only a subset of subjects completed the full 90 days of bed rest. Due to the relatively small number of women participating, the statistical power was limited.