

## **NASA's Functional Task Test: Effects of Spaceflight and Six Degree Head-Down Bedrest on Dynamic Postural Stability**

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**INTRODUCTION:** The goals of the Functional Task Test (FTT) study were to determine the effects of spaceflight on functional tests that are representative of critical exploration mission tasks and to identify the physiological factors that contribute to decrements in performance.

**METHODS:** The FTT was comprised of seven functional tests and a corresponding set of physiological measures targeting the sensorimotor, cardiovascular and muscular adaptations associated with spaceflight; including a Computerized Dynamic Posturography (CDP) protocol which has been used following spaceflight to quantify both the initial decrements and recovery of postural stability. Shuttle crewmembers, ISS crewmembers, and bedrest subjects (70 days, 6° head-down) were tested pre- and post-spaceflight and bedrest.

**RESULTS:** Head movements provided a greater challenge to sensory integration which led to greater deficits on the first post-flight/bedrest session than the head erect condition. Similar to the existing larger astronaut datasets, all FTT groups displayed large inter-subject variability, and the initial decrements after longer ISS flights were more profound and recovery was delayed compared to Shuttle flights. While the bedrest duration was comparable to ISS flights, the overall initial balance deficits and rate of recovery for bedrest subjects were similar to Shuttle flights. Finally, the initial decrements in CDP after bedrest were more profound for the control group.

**CONCLUSIONS:** Taken together, these data indicate that: 1) bedrest serves as a suitable analog to simulate the body unloading component of spaceflight; and 2) resistive and aerobic exercise provided *some* mitigation against the adaptive changes associated with bedrest, but significant postural dysfunction remained.

Word Count: 250/250