ISSMP	PHYSIOLOGICAL FACTORS CONTRIBUTING TO POSTFLIGHT CHANGES IN FUNCTIONAL PERFORMANCE	FTT

Principal Investigator

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Description

During space flight astronauts experience alterations in multiple physiological systems due to exposure to microgravity. These physiological changes include sensorimotor disturbances, cardiovascular deconditioning, loss of muscle mass and strength. These changes lead to disruption in the ability to ambulate and perform functional tasks during the initial reintroduction to a gravitational environment and may cause significant impairments in performance of operational tasks immediately following landing on a planetary surface. To date changes in functional performance that result from physiological changes have not been systematically documented. To understand how changes in physiological function impact functional performance, an interdisciplinary testing regimen has been developed that systematically evaluates both astronaut postflight functional performance and related physiological changes.

Objectives

The objective of this study is to identify the key underlying physiological factors that contribute to changes in performance of a set of functional tasks that are representative of critical mission tasks for lunar and Mars operations. We will test astronauts on an integrated suite of functional and interdisciplinary physiological tests before and after short and long-duration spaceflight
Using this strategy we will be able to: 1) identify critical mission tasks that may be impacted by alterations in physiological responses; 2) map physiological changes to alterations in functional performance and 3) design and implement countermeasures that specifically target the physiological systems responsible for impaired functional performance.

Relevance

Recently NASA's Human Research Program (HRP) conducted an extensive review of medical and scientific research findings that led to the identification of a series of risks to crew health and performance associated with exploration class missions. Research needed to define these risks was also identified and tasks are being developed to fill these knowledge gaps. This project addresses a high priority research gap that spans multiple disciplines and is called out in NASA's Small Assessment Team Report (Dec. 2006). Specifically, the report states:

> "There is a need for an integrated post-flight functional task performance test to be used on returning ISS crew members. Develop and validate operational tests to define acceptable performance ranges for standards and define the linkage between functional capabilities and physiological changes. This task should include planetary EVA-like activities."

NASA's programmatic objectives will be met with the following specific aims:

Specific Aim 1: Determine the effects of short and long-duration space flight on functional performance.
Specific Aim 2: Compare the time course of recovery in functional performance between short and long-duration space flight.
Specific Aim 3: Determine how postflight changes in sensorimotor, cardiovascular and muscle physiology impact functional performance.

BDC Summary

The preflight sessions for both long and short duration crew will be L-180, L-60 and L-30. The postflight sessions for both long and short duration crew will be R+1, R+6 and R+30. Short duration crews will also have BDC on R+0. No training is required; however there is a familiarization session at L-180.

In-flight Operations Summary

This protocol has no inflight activities.