

Fiscal Year:	FY 2009	Task Last Updated:	FY 05/13/2009
PI Name:	Smith, Scott M Ph.D.		
Project Title:	Nutritional Status Assessment: SMO 016		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Biomedical countermeasures		
Joint Agency Name:	TechPort:	No	
Human Research Program Elements:	(1) HHC :Human Health Countermeasures		
Human Research Program Risks:	(1) Immune :Risk of Adverse Health Event Due to Altered Immune Response (IRP Rev F) (2) Nutrition :Risk of Inadequate Nutrition (3) Osteo :Risk Of Early Onset Osteoporosis Due To Spaceflight (No longer used, July 2020)		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	scott.m.smith@nasa.gov	Fax:	FY 281-483-2888
PI Organization Type:	NASA CENTER	Phone:	281-483-7204
Organization Name:	NASA Johnson Space Center		
PI Address 1:	Biomedical Research and Environmental Sciences Division/SK3		
PI Address 2:	2101 NASA Pkwy		
PI Web Page:			
City:	Houston	State:	TX
Zip Code:	77058-3607	Congressional District:	36
Comments:			
Project Type:	FLIGHT	Solicitation / Funding Source:	Directed Research
Start Date:	10/01/2005	End Date:	09/30/2013
No. of Post Docs:	0	No. of PhD Degrees:	0
No. of PhD Candidates:	0	No. of Master' Degrees:	0
No. of Master's Candidates:	0	No. of Bachelor's Degrees:	0
No. of Bachelor's Candidates:	0	Monitoring Center:	NASA JSC
Contact Monitor:	Meck, J@n	Contact Phone:	281-244-5405
Contact Email:	janice.v.meck@nasa.gov		
Flight Program:	Shuttle/ISS		
Flight Assignment:	ISS		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Zwart, Sara (USRA) Heer, Martina (University of Bonn) Coburn, Stephen (Indiana University, Purdue University Fort Wayne) Booth, Sarah (Tufts University)		
Grant/Contract No.:			
Performance Goal No.:			
Performance Goal Text:			

Task Description:	SMO 016. These studies are designed to provide information about the changes in nutritional status and calcium and bone metabolism during and after space flight. It is well known that the status of some vitamins (i.e., folate, vitamin K, vitamin D) is decreased after long-duration space flight. Never before have we been able to investigate most of these changes during flight. In-flight data will assist in the interpretation of post-flight data, and it will help to assess countermeasure efficiency during flight. The investigators will measure blood levels of vitamins, minerals, oxidative damage markers, markers of iron and calcium metabolism, bone- and calcium-regulating hormones, markers of cardiovascular risk (associated with nutritional status), stress hormones, and urinary markers of bone turnover. These will provide a complete profile of nutritional status and bone and calcium metabolism, and will be important for understanding the effects of the countermeasures under consideration as well as the mechanisms of alterations that occur during space flight. Data will be collected before, during and after flight. The main potential benefit of this research is obtaining more information about the bone loss and changes in nutritional status that occur during space flight, and knowledge of how effective bone-loss countermeasures are for extended duration space flight. The information gained here will also be important for developing new treatments for metabolic disorders in the general population. See also http://www.nasa.gov/
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	Nutritional status is clearly altered after long-duration space flight. As indicated above, several nutrients demonstrate decreased status (despite adequate intake in some cases) after long-duration space flight. It is imperative that we determine the mechanism and kinetics of these changes if we are going to send crew members on exploration-class missions. The inclusion of in-flight blood/urine collections and expansion to include more parameters to better monitor nutritional status is required to better understand the role of nutrition in bone health, changes in body composition, oxidative damage, and defining nutritional requirements. Maintaining and monitoring nutritional status are important for ensuring crew health during space flight, and will be critical as we begin to embark on the longer duration exploration missions in the future. Understanding the interrelationship between nutritional status and other physiological systems inflight may also help to better understand human health for those on Earth.
Task Progress:	This study involves the collection of blood and urine samples before, during, and after flight. These data will provide a complete survey of how nutritional status and related systems are affected by space flight. Analyzing the data will help us to define nutritional requirements for long-duration missions. This expanded set of measurements will also aid in the identification of nutritional countermeasures to counteract, for example, the deleterious effects of microgravity on bone and muscle and the effects of space radiation. Sample collection protocols have been well executed, with periodic sample returns on Shuttle flights. Most samples are analyzed in a batch after flight. Individual data briefings have been provided to the first 6 completed subjects. Preliminary data have been presented to HRP and other organizations within JSC.
Bibliography Type:	Description: (Last Updated: 03/19/2022)
Articles in Peer-reviewed Journals	Zwart SR, Wolf M, Rogers A, Rodgers S, Gillman PL, Hitchcox K, Ericson KL, Smith SM. "Stability of analytes related to clinical chemistry and bone metabolism in blood specimens after delayed processing." Clin Biochem. 2009 Jun;42(9):907-10. PMID: 19250930 http://dx.doi.org/ , Jun-2009
Articles in Peer-reviewed Journals	Smith SM, Zwart SR. "Nutritional biochemistry of spaceflight." Adv Clin Chem. 2008;46:87-130. Review. PMID: 19004188 , Dec-2008
Articles in Peer-reviewed Journals	Smith SM, Zwart SR. "Nutrition issues for space exploration." Acta Astronaut. 2008 Sep;63(5-6):609-13. http://dx.doi.org/ , Sep-2008