

Fiscal Year:	FY 2012	Task Last Updated:	FY 05/10/2012
PI Name:	Smith, Scott M Ph.D.		
Project Title:	Dietary Intake Can Predict and Protect Against Changes in Bone Metabolism During Space Flight and Recovery (Pro-K)		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:			
Joint Agency Name:		TechPort:	No
Human Research Program Elements:	(1) HHC :Human Health Countermeasures		
Human Research Program Risks:	(1) Food and Nutrition :Risk of Performance Decrement and Crew Illness Due to Inadequate Food and Nutrition (2) Nutrition :Risk of Inadequate Nutrition (3) Renal Stone :Risk of Renal Stone Formation		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Organization Name:	NASA Johnson Space Center		
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City:	Houston	State:	TX
Zip Code:	77058-3607	Congressional District:	36
Comments:			
Project Type:	FLIGHT	Solicitation / Funding Source:	2007 Crew Health NNJ07ZSA002N
Start Date:	07/01/2008	End Date:	08/31/2015
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:	Baumann, David	Contact Phone:	
Contact Email:	david.k.baumann@nasa.gov		
Flight Program:	Shuttle/ISS		
Flight Assignment:	ISS ; STS-133 NOTE: End date is 8/31/2015 per PI and T. Goodwin/JSC (Ed., 6/22/2011) NOTE: period of performance changed back to 7/1/2008-6/30/2011 per JSC info (4/2009) NOTE: period of performance changed to 8/1/2008-9/30/2011 per B. Corbin/JSC (3/2009)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Shackelford, Linda (NASA JSC) Zwart, Sara (USRA) Heer, Martina (University of Bonn)		
Grant/Contract No.:	Internal Project		
Performance Goal No.:			

Performance Goal Text:	
Task Description:	Bone loss is not only well documented among astronauts during space flight, but it is a condition that also affects millions of men and women on Earth each year. Many countermeasures have been proposed, and evaluated to several degrees of completion. To date, those showing potential have focused on either exercise or pharmacological interventions, but none have specifically investigated dietary intake alone as a factor to predict or minimize bone loss during space flight. We propose to document how the ratio of acid to base precursors in the diet is related to directional changes in markers of bone resorption and formation during flight and recovery from flight. There is a high likelihood for success in predicting the extent of bone loss from dietary intake patterns among astronauts during space flight given that this concept is strongly anchored in previous ground-based data from our laboratory and others. The notion of manipulating diet to minimize bone loss could also have significant social and economic impacts for NASA and for the general public - especially given the increasing trends for diets that are high in animal protein and low in fruits and vegetables. The proposed experiments will evaluate a dietary countermeasure for bone loss that has no associated risks for side effects, no requirement for payload mass, and no additional crew time necessary during flight.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	This protocol will provide valuable data that will contribute to understanding and counteracting the bone loss of weightlessness - and more importantly will provide a dietary countermeasure to mitigate spaceflight-induced bone loss that does not have any associated risks for side effects, requires no payload mass, and will not require any additional crew time. In addition, the knowledge gained will have a significant impact on the general public, who has become accustomed to high-protein diets.
Task Progress:	Study is progressing well. To date, 5 subjects have completed the inflight portion of the study, with 2 more on orbit. Other are in varied states of preflight planning and data collection; remaining crew pitches continue. Preliminary data have been presented at 2012 HRP Investigators' Workshop meeting, and at the 2012 Experimental Biology meeting.
Bibliography Type:	Description: (Last Updated: 05/24/2023)
Abstracts for Journals and Proceedings	Zwart SR, Heer MA, Shackelford LC, Smith SM. "Urinary acid excretion can predict changes in bone metabolism during space flight." Presented at Experimental Biology 2012, San Diego, CA, April 21-25, 2012. FASEB Journal 2012 Apr;26(Meeting Abstract Supplement):244.2. http://www.fasebj.org/cgi/content/meeting_abstract/26/1_MeetingAbstracts/244.2?sid=2769b800-eb8c-4eb1-a294-a21a42a3f164 , Apr-2012
Abstracts for Journals and Proceedings	Zwart SR, Heer MA, Shackelford L, Smith SM. "Preliminary data from the Pro K experiment: Urinary acid excretion can predict changes in bone metabolism during space flight." Presented at the 2012 NASA Human Research Program Investigators' Workshop, Houston, TX, February 14-16, 2012. 2012 NASA Human Research Program Investigators' Workshop, Houston, TX, February 14-16, 2012. , Feb-2012