

<b>Fiscal Year:</b>	FY 2014	<b>Task Last Updated:</b>	FY 04/11/2014
<b>PI Name:</b>	Smith, Scott M Ph.D.		
<b>Project Title:</b>	Dietary Intake Can Predict and Protect Against Changes in Bone Metabolism During Space Flight and Recovery (Pro-K)		
<b>Division Name:</b>	Human Research		
<b>Program/Discipline:</b>	HUMAN RESEARCH		
<b>Program/Discipline-- Element/Subdiscipline:</b>			
<b>Joint Agency Name:</b>	<b>TechPort:</b>	No	
<b>Human Research Program Elements:</b>	(1) <b>HHC:</b> Human Health Countermeasures		
<b>Human Research Program Risks:</b>	(1) <b>Food and Nutrition:</b> Risk of Performance Decrement and Crew Illness Due to Inadequate Food and Nutrition (2) <b>Nutrition:</b> Risk of Inadequate Nutrition (3) <b>Renal Stone:</b> Risk of Renal Stone Formation		
<b>Space Biology Element:</b>	None		
<b>Space Biology Cross-Element Discipline:</b>	None		
<b>Space Biology Special Category:</b>	None		
<b>PI Email:</b>	<a href="mailto:scott.m.smith@nasa.gov">scott.m.smith@nasa.gov</a>	<b>Fax:</b>	FY 281-483-2888
<b>PI Organization Type:</b>	NASA CENTER	<b>Phone:</b>	281-483-7204
<b>Organization Name:</b>	NASA Johnson Space Center		
<b>PI Address 1:</b>	Biomedical Research and Environmental Sciences Division/SK3		
<b>PI Address 2:</b>	2101 NASA Pkwy		
<b>PI Web Page:</b>			
<b>City:</b>	Houston	<b>State:</b>	TX
<b>Zip Code:</b>	77058-3607	<b>Congressional District:</b>	36
<b>Comments:</b>			
<b>Project Type:</b>	FLIGHT	<b>Solicitation / Funding Source:</b>	2007 Crew Health NNJ07ZSA002N
<b>Start Date:</b>	07/01/2008	<b>End Date:</b>	08/31/2016
<b>No. of Post Docs:</b>	0	<b>No. of PhD Degrees:</b>	0
<b>No. of PhD Candidates:</b>	0	<b>No. of Master' Degrees:</b>	0
<b>No. of Master's Candidates:</b>	0	<b>No. of Bachelor's Degrees:</b>	0
<b>No. of Bachelor's Candidates:</b>	0	<b>Monitoring Center:</b>	NASA JSC
<b>Contact Monitor:</b>	Baumann, David	<b>Contact Phone:</b>	
<b>Contact Email:</b>	<a href="mailto:david.k.baumann@nasa.gov">david.k.baumann@nasa.gov</a>		
<b>Flight Program:</b>	Shuttle/ISS		
<b>Flight Assignment:</b>	ISS ; STS-133 NOTE: End date changed 8/31/2016 per PI (Ed., 4/7/15) 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)		
<b>Key Personnel Changes/Previous PI:</b>			
<b>COI Name (Institution):</b>	Shackelford, Linda ( NASA Johnson Space Center ) Zwart, Sara ( USRA ) Heer, Martina ( University of Bonn )		
<b>Grant/Contract No.:</b>	Internal Project		
<b>Performance Goal No.:</b>			

<b>Performance Goal Text:</b>	
<b>Task Description:</b>	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.
<b>Rationale for HRP Directed Research:</b>	
<b>Research Impact/Earth Benefits:</b>	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 space flight-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.
<b>Task Progress:</b>	Sixteen participating subjects have completed the inflight and (almost all) postflight protocols. As of 4/11/2014, one last subject has completed preflight data collection, and will launch to the International Space Station (ISS) later this year. Samples have been returned on Shuttle flights in 2011 on STS-133, 134, and 135, and on SpaceX 1 and 2 in 2012 and 2013. More sample returns are SpaceX3 in May 2014, and future SpaceX flights. Preliminary data have been presented at the Human Research Program (HRP) Investigator Workshop in 2012 and the Experimental Biology meeting in April 2012.
<b>Bibliography Type:</b>	Description: (Last Updated: 05/24/2023)
<b>Articles in Peer-reviewed Journals</b>	Smith SM, Abrams SA, Davis-Street JE, M. Heer M, O'Brien KO, Wastney ME, Zwart SR. "50 years of human space travel: implications for bone and calcium research." Annual Review of Nutrition. Vol. 34, in press as of April 2014. Expected publication July 2014. , Apr-2014
<b>Books/Book Chapters</b>	Smith SM, Heer M, Zwart SR. "Nutrition and Bone Health in Space." in "Nutrition and Bone Health, 2nd ed." Ed. M. Holick, J. Nieves. Springer (in press), as of April 2014. Expected publication by January 2015., Apr-2014