Fiscal Year:	FY 2010	**Task Last Updated:**	FY 03/22/2010
PI Name:	Smith, Scott M Ph.D.		
Project Title:	Stability of Pharmacotherapeutics and Nutrition Compounds-Nutrition		
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) **SHFH**:Space Human Factors & Habitability (archival in 2017)		
Human Research Program Risks:	None		
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:**	12/31/2009
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:	ISS		
Flight Assignment:	ISS Increments 13, 14, 15, 16, 17, 18 NOTE: Change in end date to 12/31/2009 per JSC info (12/2009)		
Key Personnel Changes/Previous PI:	NOTE: previously combined in project entitled Stability of Pharmacotherapeutics and Nutrition Compounds, with Scott Smith as PI and Lakshmi Putcha as Co-PI; split into two Task Book projects in January 2010 for the entire project period, per JSC direction, with each CoPI listed as PI (ed.)		
COI Name (Institution):	Swart, Sara (Universities Space Research Association) Kloeris, Vickie (NASA Johnson Space Center) Braby, Leslie (Texas A and M University) Perchonok, Michele (NASA Johnson Space Center)		
Grant/Contract No.:	Directed Research		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Data gathered from past Space Shuttle missions suggest that some of the medications packed in the Shuttle's medical pack degrade even after relatively brief periods (less than 20 days) of space flight. The observed degradation included both physical and chemical characteristics of medicine formulations. The degradation was sufficient to influence FDA stipulated shelf-life for these formulations and may result in a loss of potency. Physical and chemical instability of medications could render treatments with degraded drugs ineffective for assurance of optimal crew health during long duration space exploration missions. An evaluation of subjective data on medications used by crewmembers during space flight indicated that eight percent of all treatments administered in the Space Shuttle program were reported ineffective. Pharmaceutical instability may modify effectiveness and safety, and is one possible cause of the ineffectiveness of treatments. Degradation of food products will also render them ineffective in providing health and energy sustenance. The stability of medications and foods used by the crew, therefore, must be adequate to facilitate safe exploration of space in the future. The Stability of Pharmacotherapeutic and Nutritional Compounds (Stability) investigation will evaluate mission critical medications and foods to understand issues relating loss of potency for medicines and to nutritional adequacy of foods in space. See also http://www.nasa.gov/
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	The results of this investigation will help understand the effects of adverse environments on food and medicines, this information will assist Earth based explorers make healthy choices for long term exploration of remote and adverse habitats like the Antarctic, arctic and the world oceans.
Task Progress:	Maintaining an intact nutrient supply in the food system flown on spacecraft is a critical issue for mission success and crew health. Ground-based evidence indicates that some vitamins may be altered and fatty acids oxidized (and therefore rendered useless, or even dangerous) by long-term storage and by exposure to radiation, both of which will be issues for long-duration exploration missions in space. In this study, the stability of nutrients was investigated in food samples exposed to spaceflight on the International Space Station (ISS). Six replicates of 5 different space food items, a multivitamin, and a vitamin D supplement were packaged into 4 identical kits and were launched in 2006 on the Space Shuttle. After 13, 353, 596, and 880 days of spaceflight aboard the ISS, the kits were returned to Earth. Nine replicates of each food item and vitamin, from the same lots as those sent into space, remained in an environmental chamber on Earth to serve as controls at each time point. Vitamins, hexanal, oxygen radical absorbance capacity, and amino acids were measured in identical-lot food samples at each time point. After 596 d of spaceflight, differences in intact vitamin concentrations due to duration of storage were observed for most foodstuffs, but generally nutrients from flight samples did not degrade any faster than ground controls. This study provided the first set of spaceflight data for investigation of nutrient stability in the food system, and the results will help NASA design food systems for both ISS and space exploration missions. Study is complete and has been published. Raw data have been submitted to the LSDA.
Bibliography Type:	Description: (Last Updated: 05/24/2023)
Articles in Peer-reviewed Journals	Zwart SR, Kloeris VL, Perchonok MH, Braby L, Smith SM. "Assessment of nutrient stability in foods from the space food system after long-duration spaceflight on the ISS." J Food Sci. 2009 Sep;74(7):H209-17. PubMed PMID: 19895472 , Sep-2009