

Fiscal Year:	FY 2010	Task Last Updated:	FY 12/13/2010
PI Name:	Smith, Scott M Ph.D.		
Project Title:	Vitamin D Supplementation in an Antarctic Ground Analog of Space Flight: Study of Supplementation Protocol and Relationship to Immune System Function		
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) Nutrition: Risk of Inadequate Nutrition		
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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Zip Code:	77058-3607	Congressional District:	36
Comments:			
Project Type:	GROUND	Solicitation / Funding Source:	Directed Research
Start Date:	10/01/2006	End Date:	09/30/2010
No. of Post Docs:		No. of PhD Degrees:	
No. of PhD Candidates:		No. of Master' Degrees:	
No. of Master's Candidates:		No. of Bachelor's Degrees:	
No. of Bachelor's Candidates:		Monitoring Center:	NASA JSC
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Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Zwart, Sara (USRA/NASA Johnson Space Center) Locke, Jim (NASA Johnson Space Center) Pierson, Duane (NASA Johnson Space Center) Mehta, Satish (NASA Johnson Space Center) Bourbeau, YaVonne (Wyle/NASA Johnson Space Center)		
Grant/Contract No.:			
Performance Goal No.:			
Performance Goal Text:			

Task Description:	We recently completed a ground-based investigation evaluating the efficacy of vitamin D supplementation during the winter months in Antarctica, when UV-B radiation levels are zero. A supplement dose of 2,000 IU/d raised serum 25-hydroxyvitamin D to acceptable levels, but compliance was an issue that needs to be overcome. In this study, we will investigate whether a weekly dose of 10,000 IU vitamin D could be substituted for this daily 2,000-IU dose during the winter months in Antarctica at McMurdo Station. A secondary goal of this study is to investigate the effects of vitamin D supplementation and status on immune function in an environment known to suppress immune function. This ground analog study will enable us to provide long-duration space flight crewmembers with evidence-based recommendations for using a vitamin D supplement to achieve optimal vitamin D status before, during, and after flight.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	Altered vitamin D status before and during space flight is an issue that needs to be addressed, both for ISS missions and for exploration-class missions. Our experience with doing studies in Antarctica has shown that ground-based models of insufficient sun exposure are a valuable asset to clearly determine the optimal dose of vitamin D required to maintain circulating 25 hydroxyvitamin D at optimal levels. This study will clearly determine whether a 10000 IU weekly vitamin D supplement could be used instead of a daily dose for crewmembers during space flight. This study will also determine whether vitamin D status is related to immune function in an environment known to suppress immune function in ways similar to those observed during space flight. This will have implications for astronauts on ISS and exploration missions, as well the medical and scientific communities, and the general population. Evidence of this exists from the 2007 Antarctic vitamin D effort, which was heavily cited in the 2011 IOM Dietary Reference Intake Report.
Task Progress:	Study has been completed, and publication is in review. The study was conducted at McMurdo station from February through September 2009. Samples were received in Houston in October, and analyses were completed in 2010. Data were analyzed and submitted for publication in November 2010. Results indicate that a once-daily 2,000-IU and a once-weekly 10,000-IU vitamin D3 supplement are equally effective in increasing vitamin D status in subjects not exposed to sunlight for 6 months.
Bibliography Type:	Description: (Last Updated: 03/19/2022)
Articles in Peer-reviewed Journals	Zwart SR, Mehta SK, Ploutz-Snyder R, Bourbeau Y, Locke JP, Pierson DL, Smith SM. "Response to vitamin D supplementation during Antarctic winter is related to BMI, and supplementation can mitigate Epstein-Barr virus reactivation." Journal of Nutrition, 2011 Apr 1;141(4):692-7. PMID: 21539011 , Apr-2011
Articles in Peer-reviewed Journals	Smith SM, Gardner KK, Locke J, Zwart SR. "Vitamin D supplementation during Antarctic winter." Am J Clin Nutr. 2009 Apr;89(4):1092-8. Epub 2009 Feb 18. PMID: 19225122 , Apr-2009
Articles in Peer-reviewed Journals	Zwart SR, Smith SM. "Vitamin D and COVID-19: Lessons from spaceflight analogs." J Nutr. 2020 Jul 25:nxaa233. Published online 2020 Jul 25. https:// ; PMID: 32710111 ; PMCID: PMC7454737 , Jul-2020
Journal/Magazine covers	Zwart SR, Mehta SK, Ploutz-Snyder R, Bourbeau Y, Locke JP, Pierson DL, Smith SM. "Cover in Journal of Nutrition for article, 'Response to vitamin D supplementation during Antarctic winter is related to BMI, and supplementation can mitigate Epstein-Barr virus reactivation.'" Journal of Nutrition, 2011 Apr 1;141(4):692-7. PMID: 21539011 ; http://jn.nutrition.org/ , Apr-2011