

Fiscal Year:	FY 2015	Task Last Updated:	FY 11/12/2014
PI Name:	Platts, Steven H. Ph.D.		
Project Title:	Defining the relation between biomarkers of oxidative and inflammatory stress and atherosclerosis risk in astronauts during and after long-duration spaceflight		
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:	None		
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		
PI Address 1:	Cardiovascular Laboratory		
PI Address 2:	Biomedical Research and Environmental Sciences Division		
PI Web Page:			
City:	Houston	State:	TX
Zip Code:	77058	Congressional District:	36
Comments:			
Project Type:	FLIGHT	Solicitation / Funding Source:	2010 Crew Health NNJ10ZSA003N
Start Date:	10/01/2011	End Date:	02/29/2016
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
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Flight Program:	ISS		
Flight Assignment:	ISS NOTE: End date changed to 2/29/2016 due to PI change to Stuart M.C. Lee (Ed., 5/10/16) NOTE: End date is 5/10/2022 per R. Brady/HHC element/JSC (Ed., 10/8/15)		
Key Personnel Changes/Previous PI:	none		
COI Name (Institution):	Lee, Stuart M.S. (Wyle Science, Technology, and Engineering Group) Ploutz-Snyder, Robert Ph.D. (Universities Space Research Association) Smith, Scott Ph.D. (NASA Johnson Space Center) Stenger, Michael Ph.D. (Wyle Science, Technology, and Engineering Group) Westby, Christian Ph.D. (Universities Space Research Association)		
Grant/Contract No.:	Internal Project		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Atherosclerosis is the major contributor to cardiovascular disease-related morbidity and mortality. Research indicates that many of the risk factors commonly associated with atherosclerosis contribute to endothelial dysfunction, a process which presents early in life before angiographic evidence of disease and precedes the clinical manifestation of many cardiovascular disease-related disorders. In an effort to compensate for the initial risk factor-related disruptions to homeostasis, there is a compensatory upregulation of atheroprotective mechanisms. However, in the absence of appropriate risk factor management, these defense mechanisms may become overwhelmed and less able to reestablish normal function. Key systems that help maintain vascular homeostasis, and are susceptible to differential deleterious alterations, include those that help balance levels of oxidative and inflammatory stress. New evidence suggests that long duration spaceflight may promote oxidative and inflammatory stress through mechanisms such as radiation exposure, diet, physical inactivity, and psychological stress. However, there are no data supporting a causal link between biomarkers of oxidative and inflammatory stress and indices of vascular endothelial dysfunction in spaceflight. As such, we propose to examine the relation between biomarkers of oxidative and inflammatory stress and well established measures of vascular endothelial dysfunction (flow mediated dilation (FMD) and carotid intima-media thickness (CIMT)), in astronauts before, during, and after long duration spaceflight.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	It is well known that inflammation is a key contributor to the development of atherosclerosis. There is also emerging work showing the link with oxidative damage. This work may contribute to general clinical science by showing the interactions of multiple stressors in a unique environment (spaceflight).
Task Progress:	One astronaut volunteer has completed in pre-, in-, and immediate post-flight testing; two have participated in pre- and in-flight testing with landing scheduled after the anniversary date of this project; one has completed pre-flight testing and will launch to ISS after the anniversary date of this project, and one will start pre-flight testing in the next month. No astronaut has yet to participate in testing beyond the immediate post-flight period. Data analysis of the available data sets are in progress. Additionally, data from one subject on NASA's first one-year mission will be shared with a complementary project in the suite of Twins Studies, entitled Metabolomic and genomic markers of atherosclerosis as related to oxidative stress, inflammation, and vascular function in twin astronauts. NNJ13ZSA002N-TWINS: Differential Effects on Homozygous Twin Astronauts Associated with Differences in Exposure to Spaceflight Factors.
Bibliography Type:	Description: (Last Updated: 03/01/2018)
Abstracts for Journals and Proceedings	Lee SMC, Westby CM, Stenger MB, Smith SM, Zwart S, Ploutz-Snyder RJ, Platts SH. "Defining the relationship between biomarkers of oxidative and inflammatory stress and the risk of atherosclerosis in astronauts during and after long-duration spaceflight." Presented at 2014 NASA Human Research Program Investigators' Workshop, Galveston, TX, February 12-13, 2014. 2014 NASA Human Research Program Investigators' Workshop, Galveston, TX, February 12-13, 2014. http://www.hou.usra.edu/meetings/hrp2014/pdf/3162.pdf , Feb-2014