

Fiscal Year:	FY 2019	Task Last Updated:	FY 08/18/2019
PI Name:	Lee, Stuart M.C. 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:			
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) Cardiovascular: Risk of Cardiovascular Adaptations Contributing to Adverse Mission Performance and Health Outcomes		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	77058-2749	Congressional District:	36
Comments:			
Project Type:	FLIGHT	Solicitation / Funding Source:	2010 Crew Health NNJ10ZSA003N
Start Date:	03/01/2016	End Date:	05/10/2022
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		
Key Personnel Changes/Previous PI:	August 2019 report: Steven Laurie, Ph.D. is CoInvestigator. January 2017: Remove Dr. Rob Ploutz-Snyder as CoInvestigator; Add: Dr. Alan Feiveson as Collaborator.		
COI Name (Institution):	Smith, Scott Ph.D. (NASA Johnson Space Center) Feiveson, Alan Ph.D. (NASA Johnson Space Center) Stenger, Michael (NASA Johnson Space Center) Laurie, Steven Ph.D. (KBR/NASA Johnson Space Center)		
Grant/Contract No.:	Internal Project		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	<p>NOTE: Continuation of "Defining the Relation Between Biomarkers of Oxidative and Inflammatory Stress and Atherosclerosis Risk in Astronauts During and After Long-Duration Spaceflight" ; previous Principal Investigator was Dr. Steven Platts, until March 2016.</p> <p>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.</p>
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	<p>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).</p>
Task Progress:	<p>All pre-, in-, and immediate postflight data have been collected and processed. A manuscript describing these results has been submitted for peer-review in a scientific journal. All astronauts are participating in postflight data collections, scheduled to extend to 5 years after landing. Half of the subjects have completed their 3-year postflight test. Results from this study and previous reports are being used to inform the NASA Standard Measures Study as well Human Research Program-defined risks associated with cardiovascular disease.</p>
Bibliography Type:	Description: (Last Updated: 02/22/2024)
Abstracts for Journals and Proceedings	<p>Lee SMC, Ribeiro LC, Martin DS, Smith SM, Zwart SR, Laurie SS, Macias BR, Stenger MB. "Defining the Relationship between Biomarkers of Oxidative and Inflammatory Stress and the Risk for Atherosclerosis in Astronauts During and After Long-Duration Spaceflight." 2019 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 22-25, 2019.</p> <p>Program and abstracts. 2019 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 22-25, 2019. , Jan-2019</p>
Articles in Peer-reviewed Journals	<p>Garrett-Bakelman FE, Darshi M, Green SJ, Gur RC, Lin L, Macias BR, McKenna MJ, Meydan C, Mishra T, Nasrini J, Piening BD, Rizzardi LF, Sharma K, Siamwala JH, Taylor L, Vitaterna MH, Afkarian M, Afshinnkoo E, Ahadi S, Ambati A, Arya M, Bezzan D, Callahan CM, Chen S, Choi AMK, Chlipala GE, Contrepois K, Covington M, Crucian BE, De Vivo I, Dinges DF, Ebert DJ, Feinberg JI, Gandara JA, George KA, Goutsias J, Grills GS, Hargens AR, Heer M, Hillary RP, Hoofnagle AN, Hook VYH, Jenkinson G, Jiang P, Keshavarzian A, Laurie SS, Lee-McMullen B, Lumpkins SB, MacKay M, Maisenschein-Cline MG, Melnick AM, Moore TM, Nakahira K, Patel HH, Pietrzyk R, Rao V, Saito R, Salins DN, Schilling JM, Sears DD, Sheridan CK, Stenger MB, Tryggvadottir R, Urban AE, Vaisar T, Van Espen B, Zhang J, Ziegler MG, Zwart SR, Charles JB, Kundrot CE, Scott GBI, Bailey SM, Basner M, Feinberg AP, Lee SMC, Mason CE, Mignot E, Rana BK, Smith SM, Snyder MP, Turek FW. "The NASA Twins Study: A multidimensional analysis of a year-long human spaceflight." Science. 2019 Apr 12;364(6436):eaau8650.</p> <p>https://science.sciencemag.org/content/364/6436/eaau8650.long ; PubMed PMID: 30975860 , Apr-2019</p>