Fiscal Year:	FY 2016	**Task Last Updated:**	FY 06/22/2016
PI Name:	Simpson, Richard Ph.D.		
Project Title:	The Impact of an ISS Mission on the Anti-Viral and Functional Properties of NK-cells, T-cells, B-cells and Dendritic Cells		
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) **Immune**:Risk of Adverse Health Event Due to Altered Immune Response		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	rjsimpson@email.arizona.edu	**Fax:**	FY
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City:	Tucson	**State:**	AZ
Zip Code:	85721-0001	**Congressional District:**	3
Comments:	NOTE: Formerly at University of Houston until September 2017 move to University of Arizona.		
Project Type:	FLIGHT	**Solicitation / Funding Source:**	2014-15 HERO NNJ14ZSA001N-MIXEDTOPICS. Appendix E: Behavioral Health & Human Health Countermeasures Topics
Start Date:	06/01/2016	**End Date:**	12/31/2022
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
Contact Monitor:	Norsk, Peter	**Contact Phone:**	
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Flight Program:	ISS		
Flight Assignment:	NOTE: End date changed to 12/31/2022 (original end date was 5/31/2019) per NSSC information (Ed., 1/17/22)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Bigley, Austin Ph.D. (University of Houston) Laughlin, Mitzi Ph.D. (University of Houston) LaVoy, Emily Ph.D. (University of Houston) Spielmann, Guillaume Ph.D. (Louisiana State University) Rezvani, Katayoun M.D., Ph.D. (University of Texas M D Anderson Cancer Center)		
Grant/Contract No.:	NNX16AG02G		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	NOTE: This is an integrated project consisting of Dr. Brian Crucian's "Functional Immune Alterations, Latent Herpesvirus Reactivation, Physiological Stress, and Clinical Incidence Onboard the International Space Station" directed research; and Dr. Richard Simpson's "The Impact of an ISS Mission on the Anti-Viral and Functional Properties of NK-cells, T-cells, B-cells and Dendritic Cells," Dr. Kanokporn Rithidech's "Effects of Space Flights on the Proteome of Astronauts' Plasma," and Dr. Honglu Wu's "DNA Damage in the ISS Astronaut's Lymphocytes and Their Association with Stress-Induced Immune Dysfunction" solicited research. Immune system dysregulation is known to occur after both short and long-duration spaceflight, which may leave astronauts at risk of an adverse health event during exploration-class missions. The consistent and profound observation that spaceflight induces latent viral reactivation is a strong indication that immunity is compromised in flight. Moreover, the viruses themselves pose a very real risk to the crew and may compromise their safety and jeopardize mission success. It is pertinent therefore to comprehensively determine how spaceflight impacts the anti-viral properties of the immune system so that effective countermeasures can be developed to mitigate these risks. The parent 'Functional Immune' study will markedly advance our understanding in this area and the present proposal aims to contribute by determining the impact of an International Space Station (ISS) mission of the anti-viral properties of NK-cells and T-cells, and the function of B-cells and dendritic cells (DCs). In our ongoing ISS flight study ('Salivary Markers'), we have found that NK-cell function is drastically impaired during flight and that latent viral reactivation still occurs despite a robust expansion of viral-specific T-cells. It is possible, therefore, that it is the anti-viral capabilities of T-cells and NK-cells that are compromised in flight and we propose to address this question here using both standard and cutting-edge analytical techniques (CyTOF). We will also address the paucity of spaceflight data on B-cells and dendritic cells by assessing B-cell responses to viral peptide stimulation and the differentiation of monocytes to dendritic cells, their antigen uptake capabilities, and ability to activate and expand autologous viral-specific T-cells. All assays will be performed in crewmembers and healthy controls before, during, and after spaceflight using blood volumes that are conducive to the restrictions associated with flight experiments. The studies described in this proposal will make a significant contribution to the parent 'Functional Immune' study and will allow us to determine if spaceflight affects the anti-viral properties of cellular and humoral-mediated immunity. On conclusion of this study, it is expected that all 'immune risks' will be identified and the focus can shift to the development of countermeasures to preserve crew 'immune health' during future exploration-class spaceflight mission.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2016.
Bibliography Type:	Description: (Last Updated: 09/27/2023)