Fiscal Year:	FY 2016	**Task Last Updated:**	FY 11/30/2015
PI Name:	Bigley, Austin Ph.D.		
Project Title:	The Role of Microgravity and Stress-related Humoral Factors in Dysregulated NK-cell Function during Spaceflight		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	NSBRI--Radiation Effects Team		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	None		
Human Research Program Risks:	None		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	77204-6015	**Congressional District:**	18
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2015 NSBRI-RFA-15-01 First Award Fellowships
Start Date:	10/01/2015	**End Date:**	03/31/2017
No. of Post Docs:	1	**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:**	NSBRI
Contact Monitor:		**Contact Phone:**	
Contact Email:			
Flight Program:			
Flight Assignment:	NOTE: End date changed to 3/31/2017 (previously 5/31/2017) per NSBRI (Ed., 4/1/17) NOTE: End date changed to 5/31/2017 (previously 9/30/2016) per NSBRI (Ed., 12/27/16)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Simpson, Richard Ph.D. (MENTOR/ University of Houston)		
Grant/Contract No.:	NCC 9-58-PF04307		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	POSTDOCTORAL FELLOWSHIP Before we can ethically send Astronauts to distant locations in space, such as Mars or asteroids, it is critical that we understand how spaceflight affects the human immune system. For years, post-flight data has suggested that spaceflight has a negative impact on the immune system. Unfortunately, the majority of this data was obtained following short-duration missions after the Astronauts had returned to Earth, meaning that no in-flight data was collected. The recent 'Integrated Immune' study filled many of these knowledge gaps by analyzing blood obtained from Astronauts on the Space Shuttle (or International Space Station (ISS)) while they were still in space. Of particular interest were the findings that anti-viral immune responses were compromised during spaceflight. Consequently, latent viral reactivation can result in many negative consequences including Shingles, reduced vaccine efficacy, and increased susceptibility to infection. While the 'Integrated Immune' study focused primarily on the adaptive immune system, our 'Salivary Markers' flight experiment (Principal Investigator Dr. Richard Simpson) has focused on the innate immune system. The current proposal focuses on Natural Killer (NK)-cells, which are able to kill virally-infected and malignant cells without prior exposure. Our in-flight data shows that NK-cell anti-tumor activity is greatly reduced during spaceflight, while CMV-driven responses are amplified. The current proposal will explore two plausible mechanisms for these observations--microgravity and stress. The effects of microgravity can be simulated with a rotating wall vessel that keeps the cells in a constant state of freefall, while stress can be simulated using serum (with natural stress hormones) from Astronauts on ISS. It is hypothesized that treatment with simulated microgravity and spaceflight-derived serum will mimic the deleterious effects of spaceflight on NK-cells. Once we have determined the mechanisms underpinning the adverse effects of spaceflight on NK-cells, we can begin to develop countermeasures that will protect future space explorers from becoming immunocompromised during long-duration missions.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2016.
Bibliography Type:	Description: (Last Updated: 03/12/2021)