Fiscal Year:	FY 2017	**Task Last Updated:**	FY 02/08/2017
PI Name:	Porada, Christopher Ph.D.		
Project Title:	Effects of Microgravity on the Risks of Space Radiation-induced Leukemogenesis		
Division Name:	Space Biology		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:			
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	None		
Human Research Program Risks:	None		
Space Biology Element:	(1) Cell & Molecular Biology (2) Animal Biology: Vertebrate		
Space Biology Cross-Element Discipline:	(1) Immunology		
Space Biology Special Category:	(1) Translational (Countermeasure) Potential		
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Zip Code:	27101-3074	**Congressional District:**	5
Comments:			
Project Type:	GeneLab,GROUND	**Solicitation:**	2016 Space Biology (ROSBio) NNH16ZTT001N-GeneLab. Appendix A: Translational Systems Biology and Informatics Research Using the GeneLab Data System
Start Date:	02/01/2017	**End Date:**	01/31/2019
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 ARC
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Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Almeida-Porada, Maria Graca M.D., Ph.D. (Wake Forest University) Walker, Steve Ph.D. (Wake Forest University) Wilson, Paul Ph.D. (University of California, Davis)		
Grant/Contract No.:	NNX17AE49G		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	We will specifically be making use of data generated as part of GeneLab experiment sets GLDS-53, GLDS-55, and GLDS-25 as the basis for the novel hypothesis to be tested in the current proposal: microgravity (μG) acts in concert with solar particle event (SPE) and galactic cosmic ray (GCR) radiation to produce deleterious effects on the human hematopoietic system, which may lead to an enhanced risk of leukemogenesis, as a result of both increased genomic damage to cells of the hematopoietic system, and a reduced ability of the immune system to recognize and clear hematopoietic cells that have undergone malignant transformation as a result of exposure to SPE/GCR radiation and conditions of microgravity. Data generated from the afore-mentioned GeneLab studies support this hypothesis, as these data have shown that μG: 1) induces higher levels of spontaneous DNA damage in human hematopoietic cells; 2) markedly alters the ability of mature human immune cells to respond appropriately to stimuli; 3) diminishes the ability of human lymphocytes to efficiently repair DNA damage in response to ionizing radiation; and 4) leads to alterations in the levels of multiple miRNAs that have been implicated in a variety of human hematopoietic malignancies. We have also generated a wealth of data to support the hypothesis that μG and space radiation likely act synergistically to increase astronaut risk of leukemogenesis during a prolonged mission beyond LEO (low Earth orbit). In the present proposal, we will build upon these data by performing studies to directly test the ability of μG to increase the risk of leukemic transformation in human hematopoietic stem/progenitor cells (HSC) , while simultaneously reducing the ability of generated immune cells from recognizing and removing any malignant clones that arise.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2017.
Bibliography Type:	Description: (Last Updated: 01/17/2019)