Fiscal Year:	FY 2016	**Task Last Updated:**	FY 06/22/2016
PI Name:	Bowles, Dawn Ph.D.		
Project Title:	Proteomic Signatures of Space Radiation Induced Cardiovascular Degeneration		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Radiation health		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **SR**:Space Radiation		
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:	27710-0001	**Congressional District:**	4
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2014-15 HERO NNJ14ZSA001N-RADIATION. Appendix D: Ground-Based Studies in Space Radiobiology
Start Date:	05/12/2016	**End Date:**	05/11/2020
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
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Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Abraham, Dennis M.D. (Duke University) Kidane, Yared Ph.D. (Wyle Laboratories, Inc.) Mao, Lan M.D. (Duke University) Dewhirst, Mark D.V.M., Ph.D. (Duke University) Moseley, Martin Ph.D. (Duke University)		
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Performance Goal Text:			

Task Description:	Radiation damage and the cell's attempt to repair it triggers a myriad of signal transduction pathways which alter gene, and ultimately, protein expression. Space radiation may affect biomolecules, cellular processes, and ultimately the cellular protein content (the proteome) differently than radiation present on Earth. Epidemiological analysis of terrestrial radiation exposure indicates that single high- or multiple low-dose radiation exposure can culminate in a wide array of cardiac injury and malfunction over time. Based on terrestrial data, it is believed that cardiovascular disorders may develop in astronauts from exposure to the space radiation environment. Indeed, a recent study by Yan et al. (2014), found that a single full body exposure to a low dose of proton or iron particle radiation, which somewhat mimics the space radiation environment, was sufficient to induce a significant, long term, negative effect on murine cardiovascular function. In this proposal, we take advantage of our expertise with bioinformatics analysis of cardiovascular proteomic data sets and murine cardiovascular physiology to evaluate the consequences of low dose, chronic space radiation, or mixed field space radiation on the dynamics of the cardiac proteome and to understand how the radiation induced changes relate to cardiovascular function. In doing so, we will extend Yan et al.'s work by identifying a proteomic signature that predicts the development of permanent cardiovascular degeneration from a single low dose space radiation exposure. Further, we seek to evaluate whether the proteomic signatures differ when mice experience repeated exposures of space-like radiation or mixed field space radiation. This information will lead to a mechanistic understanding of the altered cellular and molecular processes contributing to the development of cardiovascular dysfunction at the organ and organismal level in scenarios better mimicking the space radiation environment. This information is needed to predict, monitor, and prevent cardiac damage during long term space flight. Yan, X., et al., Cardiovascular risks associated with low dose ionizing particle radiation. PLoS One, 2014. 9(10): p. e110269.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2016.
Bibliography Type:	Description: (Last Updated: 07/11/2023)