Fiscal Year:	FY 2018	**Task Last Updated:**	FY 02/22/2018
PI Name:	Rosenberg, Susan Ph.D.		
Project Title:	Discovery of Human Radiation-protection Genes and Pathways		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	TRISH--TRISH		
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		
PI Email:	smr@bcm.edu	**Fax:**	FY
PI Organization Type:	UNIVERSITY	**Phone:**	713-798-6924
Organization Name:	Baylor College of Medicine		
PI Address 1:	1 Baylor Plz		
PI Address 2:	Rm S809A		
PI Web Page:			
City:	Houston	**State:**	TX
Zip Code:	77030-3411	**Congressional District:**	9
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2017 HERO NNJ16ZSA001N-TRIRT. Appendix C: Translational Research Institute for Space Health (TRISH) Research Topics
Start Date:	10/01/2017	**End Date:**	09/30/2020
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:**	TRISH
Contact Monitor:		**Contact Phone:**	
Contact Email:			
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Miller, Kyle Ph.D. (University of Texas, Austin)		
Grant/Contract No.:	NNX16AO69A-T0109		
Performance Goal No.:			
Performance Goal Text:			

Summary: Discovery of human radiation-protection genes and pathways
Rationale: Individuals in high-radiation environments, including space, suffer DNA damage, which increases their susceptibility to cancer, among other diseases. The levels of DNA damage accumulated in cells can be used to measure the extent to which cells succumb to, or alternatively resist, the deleterious consequences of radiation. This project leverages the only known collection of genes that confer lower-than-normal levels of spontaneous DNA damage to cells to identify proteins that confer resistance to exogenous proton-beam (space-relevant) radiation.

Unique resource: We discovered 231 Escherichia coli (bacterial) genes that alter levels of DNA damage in cells when overproduced—208 that increase and 23 that decrease DNA damage, the latter of interest to radiation resistance. The

Task Description:	human-gene relatives of the bacterial “damage-up” genes also increased DNA damage when overproduced in human cells, and are highly significantly overrepresented among known cancer-driving genes. These data demonstrate the relevance and power of conserved bacterial genes for discovery of important human biology of DNA damage. Plan: We will explore the 23 E. coli DNA “damage-down” genes and their human homologs and analogs for their ability, when overproduced, to protect cells from exogenously applied proton-induced DNA damage. We will identify—(1) which E. coli genes confer resistance to proton-induced DNA damage; (2) what kinds of DNA damage they reduce; (3) which of their human-gene relatives confer resistance to proton-mediated DNA damage when overproduced, and guided by the bacterial results, test hypotheses for how they do so. Deliverables: Identities of bacterial and human proteins that protect cells from DNA damage induced by proton beams, a proxy for protection from radiation generally, and some of the mechanisms by which they do so. The human proteins and pathways of radiation resistance, when understood, can be considered as potential targets for, or models for design of, drugs for protection from radiation.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2018.
Bibliography Type:	Description: (Last Updated: 01/15/2019)