Fiscal Year:	FY 2021	**Task Last Updated:**	FY 12/02/2020
PI Name:	Blutt, Sarah Ph.D.		
Project Title:	Use of Microbial Based Countermeasures to Mitigate Radiation Induced Intestinal Damage		
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		
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Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2020 TRISH Space Radiation Solicitation TSRAD-2020. Translational Research Institute for Space Health (TRISH) Human-Based Models to Study Effects of Space Radiation and Countermeasures
Start Date:	10/01/2020	**End Date:**	09/30/2022
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:**	TRISH
Contact Monitor:		**Contact Phone:**	
Contact Email:			
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Britton, Robert Ph.D. (Baylor College of Medicine) Coarfa, Cristian Ph.D. (Baylor College of Medicine) Estes, Mary Ph.D. (Baylor College of Medicine) Grosshans, David M.D., Ph.D. (The University of Texas M.D. Anderson Cancer Center) Taniguchi, Cullen M.D., Ph.D. (The University of Texas M.D. Anderson Cancer Center)		
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Performance Goal No.:			
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Task Description:	Very little is known about how exposure to space radiation might affect gastrointestinal health and function. The high turnover rate of the intestinal stem cell (ISC) predicts that the small intestine will be vulnerable to the effects of radiation exposure associated with long duration space flight. However, there is much that is unknown about the response of the human ISC to space radiation due to the lack of in vitro and in vivo mechanistic data and systems that model the complex biology and physiology of the human small intestine. Human intestinal organoid (HIOs) cultures provide a new model system in which (1) the impacts of simulated space radiation on the ISC can be examined, (2) biomarkers of small intestinal damage and repair following radiation exposure can be identified, and (3) countermeasures to the damage can be explored. One potential countermeasure for intestinal damage is the gastrointestinal microbiome. A postulated function of the microbiome is to regulate intestinal epithelial homeostasis and participate in epithelial repair. However, neither the specific microbial communities or their factors that are capable of inducing these effects nor the epithelial cellular pathways induced have been elucidated. We have treated HIOs with conditioned media obtained from complex commensal communities derived from human stool and found that factors produced by specific communities stimulate proliferative and stem cell marker expression suggesting that the microbiome may be a putative countermeasure for space radiation induced damage of the small intestine. The results from this study will provide direct insights into the effects of simulated space radiation on the small intestinal epithelium and elucidate microbial countermeasures that facilitate epithelial renewal.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2021.
Bibliography Type:	Description: (Last Updated: 01/11/2023)