Fiscal Year:	FY 2021	**Task Last Updated:**	FY 10/22/2020
PI Name:	Hoffman, Kristyn D.V.M., Ph.D.		
Project Title:	Development of Machine Learning-Derived Microbiological and Immune Signatures: Applications in Adaptive Risk Assessment of Infectious Disease During Spaceflight		
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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City:	Houston	**State:**	TX
Zip Code:	77058-3607	**Congressional District:**	36
Comments:			
Project Type:	Ground	**Solicitation / Funding Source:**	2020 TRISH-RFA-2001-PD: Translational Research Institute for Space Health (TRISH) Postdoctoral Fellowships
Start Date:	10/01/2020	**End Date:**	09/30/2022
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:**	TRISH
Contact Monitor:		**Contact Phone:**	
Contact Email:			
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Ott, C. Mark Ph.D. (MENTOR: NASA Johnson Space Center)		
Grant/Contract No.:	NNX16AO69A-P0503		
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Performance Goal Text:			

Task Description:	POSTDOCTORAL FELLOWSHIP Risk of infection is a problem anywhere on Earth, but can be an emergency during spaceflight. Spaceflight has profound effects on microbial characteristics, including altering virulence of dangerous pathogenic organisms. Furthermore, studies in recent years have established that the human immune system is dysregulated during spaceflight, which alters astronauts' risk of acquiring infectious diseases during flight. The current proposed research would create a new assessment tool that not only measures the risks of pathogens detected in flight, but also considers alterations in host and environmental factors. We hypothesize that using machine learning, we can create a predictive risk assessment tool that considers spaceflight-induced changes to host and pathogen in the context of a flight environment, based on previous changes in microbial populations, current pathogen ecology, and host immunologic profiles unique to flight. This tool will not only aid in future microbial surveillance and response, but also on the implementation of countermeasures and planning of protocols for disease prevention, diagnosis, and treatment during long-term missions. We propose to address our hypothesis with the following three aims: Aim 1: Characterize the historical pathogen population aboard the International Space Station (ISS) to create a spaceflight microbiome signature. Aim 2: Translation of molecular approaches to microbial monitoring to clinically relevant risk profiles. Aim 3: Define the infection-specific risks developed in astronauts to create a spaceflight host signature. The data acquired from these studies will finally bridge the gap between surveillance data and risks of infection based on clinically relevancy of factors from both host and pathogen. The risk assessment tool developed from this research will have wide applications, as it can be incorporated into a software program to monitor infection risks in spacecraft and terrestrial facilities, including hospitals, schools, and airports.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	The risk assessment tool developed from this research will have wide applications, as it can be incorporated into a software program to monitor infection risks in spacecraft and terrestrial facilities, including hospitals, schools, and airports.
Task Progress:	New project for FY2021.
Bibliography Type:	Description: (Last Updated:)