Fiscal Year:	FY 2013	**Task Last Updated:**	FY 09/18/2013
PI Name:	Barrila, Jennifer Ph.D.		
Project Title:	Evaluating the Spaceflight Infectious Disease Risk Potential of Pathogenic and Commensal microorganisms using Caenorhabditis elegans as a Human Surrogate Model for Infection		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Environmental health		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **SHFH**:Space Human Factors & Habitability (archival in 2017)		
Human Research Program Risks:	(1) **Medical Conditions**:Risk of Adverse Health Outcomes and Decrements in Performance Due to Medical Conditions that occur in Mission, as well as Long Term Health Outcomes Due to Mission Exposures (2) **Microhost**:Risk of Adverse Health Effects Due to Host-Microorganism Interactions		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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City:	Tempe	**State:**	AZ
Zip Code:	85287-0001	**Congressional District:**	9
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2012 Crew Health NNJ12ZSA002N
Start Date:	09/09/2013	**End Date:**	09/08/2014
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
Contact Monitor:	Whitmore, Mihriban	**Contact Phone:**	281-244-1004
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Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Castro, Sarah (LZ TECHNOLOGY, INC.)		
Grant/Contract No.:	NNX13AR16G		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Understanding the impact of the spaceflight environment on the disease-causing potential of a wide variety of pathogenic and commensal microbes is critical for ensuring crew health, safety and performance. Changes that occur to both the immune system of astronauts and pathogenesis of microbes during spaceflight could represent a formidable challenge to the successful transition from short-to-long duration missions. This is a critical issue to address since a) the crew's immune system is dysfunctional during flight, and b) results from our collaborative team and others have demonstrated that spaceflight and/or spaceflight-analogue culture globally alters the virulence, gene expression and/or pathogenesis-related phenotypes of several microbial pathogens. This proposal aims to further to improve infectious disease risk assessment for astronauts by investigating the likelihood that a variety of microorganisms may exhibit alterations in virulence in response to the microgravity environment. We will accomplish this by profiling changes in virulence, persistence in the host, and targeted changes in gene expression of a select panel of pathogenic and commensal microorganisms exposed to spaceflight-analogue culture using the Rotating Wall Vessel (RWV) bioreactor. Microbes proposed for this study include 1) Salmonella Typhimurium, 2) Staphylococcus aureus, 3) a Space Shuttle environmental isolate of Burkholderia cepacia, and 4) Lactobacillus acidophilus, a commensal microorganism. The nematode Caenorhabditis elegans (C. elegans) will be used as a human surrogate model of infection to evaluate changes in microbial virulence in response to RWV culture and will also be profiled for targeted changes in the expression of genes important for host immunity. Moreover, as astronauts have dysfunctional immune systems during spaceflight, the susceptibility of an immunocomprised C. elegans mutant to infection with these same microbes will also be evaluated. Results from this work hold potential to provide deeper insight into the likelihood, consequence and respective uncertainties of this HRP risk.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2013.
Bibliography Type:	Description: (Last Updated: 12/08/2014)