Fiscal Year:	FY 2014	Task Last Updated:	FY 08/07/2013
PI Name:	Lorenzi, Hernan Ph.D.		
Project Title:	Study of the Impact of Long-term Space Travel on the Astronaut's Microbiome		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline Element/Subdiscipline:			
Joint Agency Name:		TechPort:	No
Human Research Program Elements:	(1) HHC :Human Health Countermeasures		
Human Research Program Risks:	 Medical Conditions: Risk of Adverse Health O that occur in Mission, as well as Long Term Health Microhost: Risk of Adverse Health Effects Due 	nutcomes and Decrements in Perf n Outcomes Due to Mission Expo to Host-Microorganism Interact	formance Due to Medical Conditions osures ions
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	hernan.lorenzi@nih.gov	Fax:	FY
PI Organization Type:	NON-PROFIT	Phone:	301-480-0648
Organization Name:	National Institute of Health		
PI Address 1:	Laboratory of Biochemistry and Genetics, Cell Cycle Regulation and Nuclear Structure Section		
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PI Web Page:			
City:	Bethesda	State:	MD
Zip Code:	20892	Congressional District:	8
Comments:			
Project Type:	Flight	Solicitation / Funding Source:	2010 Crew Health NNJ10ZSA003N
Start Date:	10/01/2011	End Date:	09/30/2014
No. of Post Docs:	0	No. of PhD Degrees:	0
No. of PhD Candidates:	0	No. of Master' Degrees:	0
No. of Master's Candidates:	0	No. of Bachelor's Degrees:	0
No. of Bachelor's Candidates:	0	Monitoring Center:	NASA ARC
Contact Monitor:	Griko, Yuri	Contact Phone:	650-604-0519
Contact Email:	Yuri.V.Griko@nasa.gov		
Flight Program:	ISS		
Flight Assignment:	ISS NOTE: Gap changes per IRP Rev E (Ed., 3/19/14)		
Key Personnel Changes/Previous PI:	August 2012: Scott Peterson (former co-PI of the p in this project any more. Drs. Mark Ott and Duane	project) and Shannon Williamson Pierson are collaborators on this	(key personnel) are not participating project.
COI Name (Institution):	Pierson, Duane (Johnson Space Center) Ott, Charlie Mark (Johnson Space Center)		
Grant/Contract No.:	NNX12AB02G		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Our goal is to determine how the composition of the human microbiome changes during long-term space exploration and to evaluate its potential impact on astronauts' health. Some microbial species from the human microbiome have a beneficial or protective effect on health; the loss of these species can lead to an altered metabolic function and, in conjunction with reduced immune response, may increase the chance of infection by opportunistic pathogens. In our proposal we will elaborate the notion of the microbiome as harbingers or sentinels to monitor a variety of aspects of the human host, including associations with health status, environmental stress, and exposure to space conditions. By sampling the microbiome of astronauts on earth while in peak physical health and during subsequent times of stress, including long-term exposure to microgravity, g-forces, radiation and changes in health status, we will be able to define signatures of human response to a variety of relevant aspects of space travel. We propose to characterize the bacterial and viral microbiome from various body sites of up to nine astronauts who travel to space at several time points before, during, and after a space mission. Also we will assess the astronauts' immune function before, during, and after the mission by analyzing their collected saliva samples for reactivated latent viruses and cortisol levels, two indicators commonly evaluated during spaceflight immune and stress studies and cytokines from blood samples. Finally, we will correlate the collected microbiome and immune function data with other measured metadata including astronaut health and hygiene as well as environmental factors such as temperature, humidity and environmental microbial samples that will be collected, depending upon availability, from various surfaces on the International Space Station.	
Rationale for HRP Directed Research:		
Research Impact/Earth Benefits:	The results of this study will provide insights into how the microbial population of the environment affects the composition and dynamics of the human microbiome. This is relevant to studies of respiratory diseases such as asthma and allergies. Investigating the impact of stress and status of the immune system on the human microbiome, and potentially on human health, during a space mission is also applicable to equivalent stressful situations on Earth. Some of the conclusions of this project will also be useful in situations where a group of individuals are confined in a relatively small and closed space for a long period of time, such as a submarine crew.	
Task Progress:	 During the second year of the project we have started the recruitment of astronauts. So far, six out of the required nine astronauts have been recruited. Since January 2013 astronauts have been collecting human microbiome samples from their bodies. Collected swab and fecal samples were submitted to the J. Craig Venter Institute for further processing and analysis. Those samples are currently being processed for DNA extraction. Blood and saliva samples were submitted to Dr. Ott's laboratory at the JSC and will be processed once all samples have been collected. 	
Bibliography Type:	Description: (Last Updated: 04/10/2021)	
Abstracts for Journals and Proceedings	Ott CM, Mehta S, Torralba M, Pierson DL, Lorenzi HA. "Study of the impact of long-term space travel on the astronauts' microbiome." 2013 NASA Human Research Program Investigators' Workshop, Galveston, TX, February 12-14, 2013. 2013 NASA Human Research Program Investigators' Workshop, Galveston, TX, February 12-14, 2013.	