Fiscal Year:	FY 2020	**Task Last Updated:**	FY 07/14/2020
PI Name:	Rana, Brinda Ph.D.		
Project Title:	Identification of Functional Metabolomic Alterations During the Simulated Spaceflight Environment		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Biomedical countermeasures		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **HHC**:Human Health Countermeasures		
Human Research Program Risks:	(1) **Bone Fracture**:Risk of Bone Fracture due to Spaceflight-induced Changes to Bone (2) **Cardiovascular**:Risk of Cardiovascular Adaptations Contributing to Adverse Mission Performance and Health Outcomes (3) **Muscle**:Risk of Impaired Performance Due to Reduced Muscle Size, Strength and Endurance (4) **Osteo**:Risk Of Early Onset Osteoporosis Due To Spaceflight (5) **SANS**:Risk of Spaceflight Associated Neuro-ocular Syndrome (SANS)		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	bkrana@ucsd.edu	**Fax:**	FY
PI Organization Type:	UNIVERSITY	**Phone:**	858-822-4010
Organization Name:	University of California, San Diego		
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PI Web Page:			
City:	La Jolla	**State:**	CA
Zip Code:	92093-5004	**Congressional District:**	49
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2014-15 HERO NNJ14ZSA001N-MIXEDTOPICS. Appendix E: Behavioral Health & Human Health Countermeasures Topics
Start Date:	03/04/2016	**End Date:**	03/31/2020
No. of Post Docs:	1	**No. of PhD Degrees:**	0
No. of PhD Candidates:	0	**No. of Master' Degrees:**	1
No. of Master's Candidates:	0	**No. of Bachelor's Degrees:**	1
No. of Bachelor's Candidates:	0	**Monitoring Center:**	NASA JSC
Contact Monitor:	Norsk, Peter	**Contact Phone:**	
Contact Email:	Peter.norsk@nasa.gov		
Flight Program:			
Flight Assignment:	NOTE: End date changed to 3/31/2020 per NSSC information (Ed., 4/6/2020) NOTE: End date changed to 12/31/2019 per NSSC information (Ed., 12/5/19) NOTE: End date is now 9/30/2019 per NSSC information (Ed., 3/12/19) NOTE: End date is now 3/03/2019 per NSSC information (Ed., 6/20/18)		
Key Personnel Changes/Previous PI:			

COI Name (Institution):	Sharma, Kumar M.D. (University of Texas, San Antonio) Patel, Hemal H Ph.D. (University of California, San Diego) Vaisar, Tomas Ph.D. (University of Washington) Hoofnagle, Andy M.D., Ph.D. (University of Washington) Ziegler, Michael Ph.D. (University of California, San Diego) Darshi, Manjula Ph.D. (University of Texas, San Antonio) Macias, Brandon Ph.D. (KBR/NASA Johnson Space Center) Lee, Stuart Ph.D. (KBR/NASA Johnson Space Center) Smith, Scott Ph.D. (NASA Johnson Space Center) Stenger, Michael Ph.D. (NASA Johnson Space Center)
Grant/Contract No.:	NNX16AG03G
Performance Goal No.:	
Performance Goal Text:	
Task Description:	The goal of the study was to identify serum and urine biomarkers that can be used to improve risk prediction for physiological manifestations due to bed rest beyond current clinical measures and predictors. To accomplish this goal, we proposed to conduct untargeted and targeted metabolomic assays on urine and plasma samples collected longitudinally throughout a 30 day head down tilt bed rest study with elevated CO2 and follow-up these studies with mitochondrial function assays. Our samples consisted of plasma and 24 hour pooled urine samples from 11 subjects who underwent head down tilt (HDT) bed rest for 30 days at :Envihab.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	Space Research Related Impact: This study has the potential to identify novel biomarkers in plasma and urine to detect the risk for and monitor the progression of physiological outcomes induced by the spaceflight environment. Research Impact on Earth: The study has potential to identify the sequence of metabolic events leading to disruption of metabolic pathways in individuals experiencing temporary bed rest (e.g., during pregnancy) or permanent bed rest (e.g., due to aging or disabilities). In the future, countermeasures can be developed to target these pathways. Assay Development: We are optimizing the application of a high throughput mitochondrial flux assay (Seahorse Assay) to detect circulating factors that can alter changes in mitochondrial function (glycolysis and respiration). This assay can then be applied to investigate environmental factors impacting bioenergetics of different tissue and cells for both Earth and Space related research.
Task Progress:	We analyzed plasma and 24 hour collection urine samples from 11 participants of the VaPER study, a 30 day head down tilt bed rest (HDTBR) study with elevated ambient carbon dioxide that was conducted at :Envihab. We collected plasma samples at 8 timepoints including pre-, during, and post-HDTBR. Mass spectrometry (MS) based targeted and untargeted metabolomics were conducted on plasma and urine samples, followed by mitochondrial respiration assays on the plasma samples utilizing the SeaHorse platform. Our aims were expanded within the budget to include an MS based proteomic investigation of the urine samples. The goal of the study was to identify serum and urine biomarkers that can be used to improve risk prediction for physiological manifestations due to bed rest beyond current clinical measures and predictors.
Bibliography Type:	Description: (Last Updated: 07/30/2019)