

<b>Fiscal Year:</b>	FY 2015	<b>Task Last Updated:</b>	FY 09/10/2014
<b>PI Name:</b>	Goel, Namni Ph.D.		
<b>Project Title:</b>	Biomarkers as Predictors of Resiliency and Susceptibility to Stress in Space Flight		
<b>Division Name:</b>	Human Research		
<b>Program/Discipline:</b>			
<b>Program/Discipline--Element/Subdiscipline:</b>	HUMAN RESEARCH--Behavior and performance		
<b>Joint Agency Name:</b>	<b>TechPort:</b>	No	
<b>Human Research Program Elements:</b>	(1) <b>HFBP</b> :Human Factors & Behavioral Performance (IRP Rev H)		
<b>Human Research Program Risks:</b>	(1) <b>BMed</b> :Risk of Adverse Cognitive or Behavioral Conditions and Psychiatric Disorders		
<b>Space Biology Element:</b>	None		
<b>Space Biology Cross-Element Discipline:</b>	None		
<b>Space Biology Special Category:</b>	None		
<b>PI Email:</b>	<a href="mailto:namni_goel@rush.edu">namni_goel@rush.edu</a>	<b>Fax:</b>	FY 312-563-4900
<b>PI Organization Type:</b>	UNIVERSITY	<b>Phone:</b>	312-563-4726
<b>Organization Name:</b>	Rush University Medical Center		
<b>PI Address 1:</b>	Department of Psychiatry and Behavioral Sciences, Biological Rhythms Research Laboratory		
<b>PI Address 2:</b>	1645 W. Jackson Blvd., Suite 425		
<b>PI Web Page:</b>			
<b>City:</b>	Chicago	<b>State:</b>	IL
<b>Zip Code:</b>	60612	<b>Congressional District:</b>	7
<b>Comments:</b>	NOTE: Formerly at the University of Pennsylvania until July 2019.		
<b>Project Type:</b>	GROUND	<b>Solicitation / Funding Source:</b>	2013 HERO NNJ13ZSA002N-Crew Health (FLAGSHIP & NSBRI)
<b>Start Date:</b>	10/01/2014	<b>End Date:</b>	09/30/2017
<b>No. of Post Docs:</b>		<b>No. of PhD Degrees:</b>	
<b>No. of PhD Candidates:</b>		<b>No. of Master' Degrees:</b>	
<b>No. of Master's Candidates:</b>		<b>No. of Bachelor's Degrees:</b>	
<b>No. of Bachelor's Candidates:</b>		<b>Monitoring Center:</b>	NASA JSC
<b>Contact Monitor:</b>	Leveton, Lauren	<b>Contact Phone:</b>	
<b>Contact Email:</b>	<a href="mailto:lauren.b.leveton@nasa5.gov">lauren.b.leveton@nasa5.gov</a>		
<b>Flight Program:</b>			
<b>Flight Assignment:</b>	NOTE: End date changed to 9/30/2017 (from 09/30/2018) per PI and NSSC information (Ed., June 2015)		
<b>Key Personnel Changes/Previous PI:</b>			
<b>COI Name (Institution):</b>	Abel, Ted Ph.D. ( University of Pennsylvania ) Basner, Mathias M.D., Ph.D. ( University of Pennsylvania ) Bhatnagar, Seema Ph.D. ( Children's Hospital of Philadelphia ) Dinges, David Ph.D. ( University of Pennsylvania ) Kirkpatrick, James M.D. ( Hospital of the University of Pennsylvania ) Weljie, Aalim Ph.D. ( University of Pennsylvania )		
<b>Grant/Contract No.:</b>	NNX14AN49G		
<b>Performance Goal No.:</b>			
<b>Performance Goal Text:</b>			

Task Description:	<p>This proposal is responsive to the NASA Behavioral Health and Performance gap (BMed5) to find individual characteristics that predict successful adaptation and performance in an isolated, confined, and extreme environment, especially for long duration missions. The project also relates to Human Research Program (HRP) Sleep Gap 4 to identify indicators of individual susceptibilities and resiliencies to sleep loss and circadian rhythm disruption, to aid with individualized countermeasure regimens, for autonomous, long duration, and/or distance exploration missions. The proposal is also responsive to BMed 1 and BMed 2, and Sleep Gap 2 and Sleep Gap 9. To address these gaps, this proposal will assess biomarkers as predictors of resiliency and susceptibility (individual differences) to performance stress and sleep loss using the HRP Human Exploration Research Analog (HERA) and the Hawaii Space Exploration Analog and Simulation (HI-SEAS) high fidelity space analog facilities. We will conduct a ground-based experiment—strongly anchored in our previous laboratory-based research—on N=32 healthy men and women (ages 26-55) in the HERA facility (short-duration analog) and on N=6 healthy men and women (ages 21-65) in the HI-SEAS facility (long-duration analog) to determine the predictive validity of a set of relevant, valid, and reliable biomarkers for distinguishing those who are more resilient versus those who are more susceptible to the adverse neurobehavioral effects of the combination of high performance demands and total sleep deprivation (TSD) stressors—two conditions commonly experienced in space flight. These biomarkers include the following: cardiovascular measures (blood pressure, heart rate, and heart rate variability, stroke volume and cardiac output), salivary cortisol, catecholamines (dopamine, noradrenaline, and adrenaline), an inflammatory marker (C Reactive Protein; CRP), metabolomic markers (via unbiased metabolomics), and microRNAs (epigenetic markers). The project deliverable will be a countermeasure (set of diverse biomarkers) for distinguishing those who are more resilient versus those who are more susceptible to the adverse neurobehavioral effects of high performance demands and sleep loss stressors. If valid markers of such susceptibility can be found, it will be possible to optimize and individualize crew resources, and mitigate stress and other behavioral health and performance risks autonomously during long-duration space flight.</p>
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2015.
Bibliography Type:	Description: (Last Updated: 09/28/2023)