Fiscal Year:	FY 2013	Task Last Updated:	FY 05/10/2013
PI Name:	Lee, Michael L Ph.D.		
Project Title:	Assessing the Impact of Chronic Sleep Restriction on Sleep and Performance-Associated Regional Brain Activation Using Near-Infrared Spectroscopy		
Division Name:	Human Research		
Program/Discipline:	NSBRI		
Program/Discipline Element/Subdiscipline:	NSBRIHuman Factors and Performance	e Team	
Joint Agency Name:		TechPort:	No
Human Research Program Elements:	(1) BHP: Behavioral Health & Performan	ce (archival in 2017)	
Human Research Program Risks:	(1) BMed:Risk of Adverse Cognitive or Behavioral Conditions and Psychiatric Disorders		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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PI Organization Type:	UNIVERSITY	Phone:	617-525-8558
Organization Name:	Brigham and Women's Hospital		
PI Address 1:	Brigham and Women's Hospital		
PI Address 2:	Division of Sleep and Circadian Disorder	rs	
PI Web Page:			
City:	Boston	State:	MA
Zip Code:	02115	Congressional District:	8
Comments:			
Project Type:	Ground	Solicitation / Funding Source:	2012 NSBRI-RFA-12-02 Postdoctoral Fellowships
Start Date:	10/01/2012	End Date:	10/31/2014
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:	NSBRI
Contact Monitor:		Contact Phone:	
Contact Email:			
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Klerman, Elizabeth M.D., Ph.D. (MENTOR/Brigham and Women's Hospital) Strangman, Gary Ph.D. (Massachusetts General Hospital)		
Grant/Contract No.:	NCC 9-58-PF03002		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	POSTDOCTORAL FELLOWSHIP Astronauts and supporting ground crew need to maintain high levels of physical and cognitive performance to ensure successful completion of space missions and safety of the astronauts. Astronauts and ground crews are often exposed to work challenges that are not conducive for restful sleep. Sleep loss can arise from shifting and extended work schedules that are commonly associated with space exploration. As a result, many astronauts are at risk for fatigue-related accidents that can endanger the success of space missions and personal safety. A major challenge in combating fatigue is accurate diagnosis. Subjective reporting of sleepiness is frequently significantly less than that obtained from objective measurements, indicating that self-diagnosis is inaccurate, even without including motivational reasons for an individual to report higher level of alertness than (s)he truly feels. Preliminary evidence suggests that sleep deprivation reduces activation in the prefrontal cortex, which is known to be important for executive function and cognitive performance. A recently-developed technology, substantially developed with NSBRI support, allows for the quantification of oxygenated and de-oxygenated blood within the brain using near-infrared spectroscopy (NIRS). NIRS detects regional brain activity alterations associated with hemodynamic changes. Previous methodology for assessing hemodynamic levels required large, expensive functional magnetic resonance imaging (MRI) or positron emission tomography (PET) techniques that are impractical for use in space or most work environments. In contrast, NIRS technology is a highly portable and relatively inexpensive, and simple
	device for assessing regional brain activity. Here, I propose to use NIRS to measure regional brain activation in the prefrontal cortex during performance testing and during sleep in participants experiencing chronic sleep restriction. I will test the effects of sleep restriction at different circadian phases on prefrontal cortex activation during a cognitive performance task and during deep sleep. Results from this study can lead to the potential use of NIRS technology to objectively monitor sleepiness and reducing fatigue-related accidents.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2013.
Bibliography Type:	Description: (Last Updated: 08/25/2020)