Fiscal Year:	FY 2020	**Task Last Updated:**	FY 11/07/2019
PI Name:	Bershad, Eric M. M.D.		
Project Title:	SPACE-CENT: Studying the Physiological and Anatomical Cerebral Effects of CENTrifugation and Head Down Tilt Bed Rest		
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) **SANS**:Risk of Spaceflight Associated Neuro-ocular Syndrome (SANS) (2) **Sensorimotor**:Risk of Altered Sensorimotor/Vestibular Function Impacting Critical Mission Tasks		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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PI Organization Type:	UNIVERSITY	**Phone:**	713-504-0223
Organization Name:	Baylor College of Medicine		
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PI Web Page:			
City:	Houston	**State:**	TX
Zip Code:	77030-3411	**Congressional District:**	9
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2015-16 HERO NNJ15ZSA001N-AGBR. Appendix G: Physiological & Behavioral Responses in Humans to Intermittent Artificial Gravity during Bed Rest
Start Date:	01/09/2017	**End Date:**	03/31/2021
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:**	NASA JSC
Contact Monitor:	Norsk, Peter	**Contact Phone:**	
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Flight Program:			
Flight Assignment:	NOTE: Extended to 3/31/2021 per D. Risin/JSC and NSSC information (Ed., 8/26/20) NOTE: Extended to 9/30/2020 per NSSC information (Ed., 10/18/19)		
Key Personnel Changes/Previous PI:	November 2019 update: Bryn A. Martin, Ph.D., Associate Professor of Biological Engineering at University of Idaho, added to team. He will apply automated imaging to analysis structural changes of the globe in MRI imaging acquired in our study. This quantitative data will be useful to determine whether the artificial gravity protects the eye from structural changes from the 60 days of 6 degree head down tilt exposure.		

COI Name (Institution):	Clark, Jonathan M.D. (Baylor College of Medicine) Cohen, Helen Ed.D. (Baylor College of Medicine) Kramer, Larry M.D. (University of Texas, Houston) Marshall-Goebel, Karina Ph.D. (KBR/NASA Johnson Space Center) Rittweger, Joern M.D. (Deutsches Zentrum Fuer Luft- Und Raumfahrt E.V.) Sangi-Haghpeykar, Haleh Ph.D. (Baylor College of Medicine) Stern, Claudia M.D. (German Aerospace Cente (DLR)) Strangman, Gary Ph.D. (Massachusetts General Hospital) Venkatasubba Rao, Chethan M.D. (Baylor College of Medicine) Damani, Rahul M.D. (Baylor College of Medicine) Laurie, Steven Ph.D. (KBR/NASA Johnson Space Center)
Grant/Contract No.:	NNX17AE04G
Performance Goal No.:	
Performance Goal Text:	
Task Description:	This project will assess the physiological and anatomical effects of two different regimens of intermittent centrifugation induced artificial gravity (AG) with focus on the brain, eye, and vestibular system responses. The specific aims include: 1. Integrative evaluation of the cerebral physiological effects of AG during the 60 day bed rest period using between group and within group comparisons, and 2. Assessment of the acute dynamic changes in the human body systems related to the centrifugation regimen. The methods and techniques used to achieve these objectives include: non-invasive assessment of ICP (intracranial pressure), cerebral blood flow, cerebral blood volume, CSF (cerebrospinal fluid) flow and volumes, ocular anatomy and physiology, and neurovestibular function. This proposal will deliver an integrated view of the physiological, anatomical, and functional effects of intermittent centrifugation (artificial gravity) on the cerebrovascular, ocularm, and vestibular systems. This will provide important insights into the effectiveness of this form of artificial gravity to counteract the headward fluid shifting of head down tilt, which may yield important knowledge about the future utility of this method as a countermeasure for the spaceflight-induced headward fluid shifts and the Spaceflight Associated Neuro-ocular Syndrome (SANS).
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	This project will implement a wide array of non-invasive monitoring technologies for the brain, vascular system, eye, and sensorimotor system. Some of these technologies are commercially available for Earth based medicine in a variety of health care settings including the intensive care unit, emergency room, and may be implementable in rural and/or remote settings, and could be monitored by clinicians via telemedicine.
Task Progress:	Subject recruitment for campaign 1 of 2 was successful, and all 12 enrolled subjects completed the study and all procedures. Campaign 2 is currently underway, and expected to complete by the end of 2019. The following procedures were successfully conducted in all participants with no major technical issues: Transcranial doppler, cerebral perfusion monitoring (cFLOW), near infrared spectroscopy, internal jugular vein ultrasound, optical coherence tomography, intraocular pressure, optical biometry, visual acuity, visual field testing, cycloplegic refraction, field testing (sit-to-stand, recovery from fall, jump down test, standing on foam, tandem walk), iPAS (eye movements), MRI: brain and eye structure, CSF flow, cerebral blood flow, globe imaging, and transcutaneous CO2 measurement during sleep. Data analysis will be ongoing until study completion September 2020.
Bibliography Type:	Description: (Last Updated: 11/05/2023)