Fiscal Year:	FY 2021	**Task Last Updated:**	FY 06/30/2021
PI Name:	Macias, Brandon Ph.D.		
Project Title:	Mitigating Headward Fluid Shifts with Veno-Constrictive Thigh Cuffs During Spaceflight		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:			
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)		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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PI Organization Type:	NASA CENTER	**Phone:**	281-483-2026
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Zip Code:	77058	**Congressional District:**	36
Comments:	NOTE: Became civil servant fall 2020; previously KBR/NASA Johnson Space Center. Prior to that until 2016, was at the University of California, San Diego.		
Project Type:	FLIGHT,GROUND	**Solicitation / Funding Source:**	Directed Research
Start Date:	05/15/2021	**End Date:**	05/14/2026
No. of Post Docs:		**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
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Flight Program:	ISS		
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Laurie, Steven Ph.D. (KBR/NASA Johnson Space Center) Marshall-Goebel, Karina Ph.D. (KBR/NASA Johnson Space Center) Lee, Stuart Ph.D. (KBR/NASA Johnson Space Center) Jasien, Jessica Ph.D. (JES/NASA Johnson Space Center) Cole, Chris Ph.D. (Clemson University) Foulk, Jonn Ph.D. (Clemson University)		
Grant/Contract No.:	Directed Research		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Veno-constrictive thigh cuffs (VTC) are a mechanical countermeasure capable of reducing headward fluid shifts in both ground-based and spaceflight studies, and thus, may be a countermeasure against development of the spaceflight associated neuro-ocular syndrome (SANS). In addition, VTC are at a high technical readiness level (TRL) and are compact and lightweight, making them compatible with the spaceflight operations environment. Here, we propose to investigate the effectiveness of VTC for mitigating spaceflight-induced headward fluid shifts in crewmembers before and during spaceflight missions to the International Space Station (ISS) using advanced imaging and physiological assessments. VTC will be used continuously, up to six hours with intermittent measures during this session, allowing us to characterize the temporal profile of this candidate countermeasure. Specific Aim: Determine the efficacy of veno-constrictive thigh cuff application to mitigate a spaceflight-induced headward fluid shift. We hypothesize that a VTC countermeasure will temporarily reverse or attenuate spaceflight-induced ocular and cardiovascular changes. In addition, use of VTC for a longer duration than was used with the Chibis lower body negative pressure (LBNP) device during the Fluid Shifts study will allow us to investigate what role the duration of exposure has on our outcome variables.
Rationale for HRP Directed Research:	This research is directed because it contains highly constrained research. This study will determine the ability of veno-constrictive thigh cuffs (VTC) application for varying durations to mitigate the weightlessness-induced headward fluid shift during spaceflight for the purpose of evaluating this device as a countermeasure for Spaceflight Associated Neuro-ocular Syndrome (SANS). The effects of varying durations of continuous VTC usage (30 minutes, 3 hours, and 6 hours) on ocular and cardiovascular variables will be investigated. This proposed study will help determine the potential efficacy of VTC to mitigate the cephalad fluid shift that is hypothesized to be the primary initiating factor to SANS. The VTC countermeasure technique is low-mass, portable, simple to use and may be used for extended durations while working in an operational spaceflight environment. The investigator team has the required expertise to conduct this research and has experience from a ground study led by this team in 33 subjects who wore these VTC for up to ~2 hours while supine at rest. An updated VTC and microfiber sleeve have been developed and tested in these ground-based studies.
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2021.
Bibliography Type:	Description: (Last Updated: 04/04/2024)