Fiscal Year:	FY 2019	Task Last Updated:	FY 09/11/2019
PI Name:	Ethier, Christopher Ph.D.		
Project Title:	Changes of the Optic Nerve Dura Mater in Astron	nauts and SANS (OPTIMA)	
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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Comments:			
Project Type:	Ground	Solicitation / Funding Source:	2018 HERO 80JSC018N0001-Crew Health and Performance (FLAGSHIP, OMNIBUS). Appendix A-Flagship, Appendix B-Omnibus
Start Date:	07/17/2019	End Date:	07/16/2020
No. of Post Docs:		No. of PhD Degrees:	
No. of PhD Candidates:		No. of Master' Degrees:	
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Flight Program:			
Flight Assignment:			
Flight Assignment: Key Personnel Changes/Previous PI:			
Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution):	Laurie, Steven Ph.D. (Wyle Laboratories/NASA Lee, Stuart Ph.D. (Wyle Laboratories/NASA Joh Loerch, Linda M.S. (NASA Johnson Space Cent Macias, Brandon Ph.D. (Wyle Laboratories/NAS Martin, Bryn Ph.D. (University of Idaho, Mosco	Johnson Space Center) inson Space Center) ter) SA Johnson Space Center) w)	
Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Grant/Contract No.:	Laurie, Steven Ph.D. (Wyle Laboratories/NASA Lee, Stuart Ph.D. (Wyle Laboratories/NASA Joh Loerch, Linda M.S. (NASA Johnson Space Cent Macias, Brandon Ph.D. (Wyle Laboratories/NAS Martin, Bryn Ph.D. (University of Idaho, Mosco 80NSSC19K1298	Johnson Space Center) Inson Space Center) Ier) SA Johnson Space Center) w)	
Flight Assignment: Key Personnel Changes/Previous PI: COI Name (Institution): Grant/Contract No.: Performance Goal No.:	Laurie, Steven Ph.D. (Wyle Laboratories/NASA Lee, Stuart Ph.D. (Wyle Laboratories/NASA Joh Loerch, Linda M.S. (NASA Johnson Space Cent Macias, Brandon Ph.D. (Wyle Laboratories/NAS Martin, Bryn Ph.D. (University of Idaho, Mosco 80NSSC19K1298	Johnson Space Center) inson Space Center) ter) SA Johnson Space Center) w)	

Task Description:	Astronauts experience multiple physiological changes during spaceflight. One such potential change is spaceflight associated neuro-ocular syndrome (SANS), a spectrum of ocular alterations that can affect sight. We do not understand why this occurs or how to prevent it. One hypothesis is that changes in the mechanical properties of the tissue sheath surrounding the optic nerve (the dura mater) can affect a sensitive region of the eye (the optic nerve head) where many alterations are observed in astronauts. Another hypothesis is that thickening of the choroid, a tissue within the eye that is known to swell during spaceflight, leads to abnormally large mechanical strains on the anterior part of the optic nerve head. Our central objective is to use existing, novel methods that we have developed to evaluate these hypotheses. First, we will compute the mechanical properties of the dura mater in astronauts, see whether these properties are different than in subjects who have not been in space, and see whether they correlate with the severity of SANS. To do so, we will use existing sets of magnetic resonance (MR) scans: one taken when the astronaut is lying supine, and the other taken when the astronaut is lying in 15 degree head-down tilt. By analyzing these images, and building a computational model of how the optic nerve head due to choroidal swelling, see if these strains are larger than those which occur on Earth, and see if they are related to the severity of SANS in astronauts. Choroidal swelling in space has already been measured using optical imaging technology, and thus we can immediately use our modeling approach with this data set. This work directly addresses the following stated goal of the Request for Applications (RFA): Quantification of the crew health and performance risks associated with human spaceflight for the various exploration missions. More specifically, it addresses two needs identified by NASA related to SANS. First, we do not know the etiological mechanisms and contributing risk factors for
Rationale for HRP Directed Research:	:
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2019.
Bibliography Type:	Description: (Last Updated: 11/26/2021)