Fiscal Year:	FY 2014	**Task Last Updated:**	FY 09/03/2013
PI Name:	Stenger, Michael Ph.D.		
Project Title:	Distribution of Body Fluids during Long Duration Space Flight and Subsequent Effects on Intraocular Pressure and Vision Disturbance		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
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) **Cardiovascular**:Risk of Cardiovascular Adaptations Contributing to Adverse Mission Performance and Health Outcomes (2) **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:**	281-483-1311
Organization Name:	NASA Johnson Space Center		
PI Address 1:	SK3/Biomedical Research and Environmental Sciences Division		
PI Address 2:			
PI Web Page:			
City:	Houston	**State:**	TX
Zip Code:	77058	**Congressional District:**	22
Comments:	NOTE Aug 2018: Previously with KBRwyle at Johnson Space Center		
Project Type:	FLIGHT	**Solicitation / Funding Source:**	2011 Crew Health NNJ11ZSA002NA
Start Date:	10/01/2012	**End Date:**	09/30/2015
No. of Post Docs:	0	**No. of PhD Degrees:**	0
No. of PhD Candidates:	0	**No. of Master' Degrees:**	0
No. of Master's Candidates:	0	**No. of Bachelor's Degrees:**	0
No. of Bachelor's Candidates:	0	**Monitoring Center:**	NASA JSC
Contact Monitor:	Norsk, Peter	**Contact Phone:**	
Contact Email:	Peter.norsk@nasa.gov		
Flight Program:	ISS		
Flight Assignment:	ISS NOTE: Risk/Gap changes per IRP Rev E (Ed., 3/24/14)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Johnston, Smith (NASA Johnson Space Center) Lee, Stuart (Wyle Laboratories, Inc.) Martin, David (Wyle Laboratories, Inc.) Platts, Steven (NASA Johnson Space Center) Ploutz-Snyder, Robert (Universities Space Research Association, Columbia) Smith, Scott (NASA Johnson Space Center) Soller, Babs (Reflectance Medical Inc.) Westby, Christian (Universities Space Research Association, Columbia)		
Grant/Contract No.:	Internal Project		
Performance Goal No.:			

Performance Goal Text:	
Task Description:	The central objective of the proposed work is to determine the magnitude of the headward fluid shift during long duration space flight and to measure the subsequent compartmentalization of this fluid. The second objective is to determine if individual responses to this space flight-induced fluid shift are correlated with the individual differences in the space flight-induced change in intraocular pressure and visual acuity. Finally, the third objective is to compare the space flight fluid shift/distribution with that which occurs in head-down tilt bed rest, a terrestrial analog of space flight deconditioning. In order to determine the effect of space flight on the headward fluid shift and subsequent redistribution across fluid compartments, biochemical, ultrasound and other non-invasive cardiovascular measures will be performed before launch, during flight and after landing. Total body water, extracellular and intracellular fluid volume will be determined by biochemical dilution techniques. Ultrasound will be used to assess upper vs. lower body interstitial fluid and vein diameter changes, cerebral blood flow, optic nerve sheath diameter and central venous pressure. Near infrared spectroscopy will be used to measure lower vs. upper body local tissue hydration, and total peripheral resistance will be calculated from noninvasively acquired blood pressure and cardiac output. It is currently unclear why only some astronauts experience vision disturbances with space flight. It is hypothesized that astronauts respond differently to the fluid shift in-flight and that this impacts changes in intraocular / intracranial pressure and vision changes. The goal of this study is to test this hypothesis. In doing so, this proposal directly addresses the Integrated Research Plan Gap CV7: How are fluids redistributed in-flight? and Gap VIIP1: What is the etiology of visual acuity and ocular structural and function changes seen in-flight and post-flight? The research proposed here will determine the effect of long duration space flight on fluid shifts and subsequent redistribution across fluid compartments and attempt to discern the contribution of these adaptations to changes in intraocular / intracranial pressure and vision disturbances. NOTE: This study was merged with investigations from Dr. Alan Hargens (Fluid distribution before, during and after prolonged space flight) and Dr. Scott Dulchavsky (Microgravity associated compartmental equilibration) resulting in a comprehensive study titled “Fluid Shifts Before, During and After Prolonged Space Flight and Their Association with Intracranial Pressure and Visual Impairment” (short title: Fluid Shifts).
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	Knowledge gained from this study may inform medical professionals treating and studying patients suffering from idiopathic intracranial hypertension, a debilitating condition with some characteristics in common with that experienced by astronauts.
Task Progress:	This study was merged with investigations from Dr. Alan Hargens (Fluid distribution before, during and after prolonged space flight) and Dr. Scott Dulchavsky (Microgravity associated compartmental equilibration) resulting in a comprehensive study titled “Fluid Shifts Before, During and After Prolonged Space Flight and Their Association with Intracranial Pressure and Visual Impairment” (short title: Fluid Shifts). This past year was spent merging these studies together in such a way as to maintain original specific aims from original protocols without impacting quality of science. The combined study has been approved by the Health and Human Countermeasures Element and has received Institutional Review Board approval and completed the ISSMP feasibility assessment process. Currently, this study is under review by the Science Management Panel for Select for Flight. This study has been pitched to the one-year crew, which, if selected, will be the first crew to participate in this study.
Bibliography Type:	Description: (Last Updated: 05/20/2022)