

Fiscal Year:	FY 2015	Task Last Updated:	FY 07/07/2015
PI Name:	Platts, Steven H. Ph.D.		
Project Title:	Effects of Long Duration Spaceflight on Venous and Arterial Compliance in Astronauts		
Division Name:	Human Research		
Program/Discipline:	NSBRI		
Program/Discipline--Element/Subdiscipline:	NSBRI--Cardiovascular Alterations Team		
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 (IRP Rev I)		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Organization Name:	NASA Johnson Space Center		
PI Address 1:	Cardiovascular Laboratory		
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City:	Houston	State:	TX
Zip Code:	77058	Congressional District:	36
Comments:			
Project Type:	FLIGHT,GROUND	Solicitation:	2012 Crew Health NNJ12ZSA002N
Start Date:	06/01/2013	End Date:	05/31/2017
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:	NSBRI
Contact Monitor:	Contact Phone:		
Contact Email:			
Flight Program:	Pre/Post Flight		
Flight Assignment:	ISS pre- and postflight NOTE: End date changed to 5/31/2017 per NSBRI (Ed., 1/27/16)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Ribeiro, Laura Christine (Wyle Laboratories) Westby, Christian (Universities Space Research Association, Columbia) Martin, David (Wyle Laboratories) Ploutz-Snyder, Robert (Universities Space Research Association, Columbia) Lee, Stuart (Wyle Integrated Sciences and Engineering Group) Garami, Zsolt (The Methodist Hospital System) Stenger, Michael (Wyle Laboratories)		
Grant/Contract No.:	NCC 9-58-CA03402		
Performance Goal No.:			
Performance Goal Text:			

	<p>The purpose of this study is to use non-invasive methodologies (ultrasound) to track changes in venous and arterial compliance in the head and neck and to relate these changes to development of the recently-identified Vision Impairment and Intracranial Pressure (VIIP) syndrome in astronauts. The study is composed of three separate but related research projects (bed rest, astronaut ground, and data mining), which address two specific aims.</p> <p>Specific Aim I: To evaluate the effect of 14-days of 6 degrees head-down tilt bed rest, a model of spaceflight, and aging on vascular compliance after using a test subject population similar to younger (25-35 yrs) and older (45-55 yrs) astronaut cohorts. Hypothesis 1: Pre-bed rest vascular compliance in the head and neck will be higher in younger subjects compared to older subjects. Hypothesis 2: Following bed rest, both groups of subjects will exhibit decreased vascular compliance in the head and neck, but vascular compliance will decrease more in the older subjects than in younger subjects. Hypothesis 3: Subjects in this bed rest study will have more pronounced ocular changes/VIIP symptoms than those in a previous 14-day bed rest study due to the increased sodium content in the diet. The data collection portion of the bed rest study was completed before the closure of the Flight Analogs Research Unit at University of Texas Medical Branch (UTMB) in Galveston, TX, on December 31, 2014. Seven young men and 4 older men participated. The compressed schedule from the time of the approval to proceed with work at UTMB, to the closure of the Flight Analogs Unit and difficulties in recruiting subjects who passed the inclusion criteria did not allow us to collect data on the total number of 20 planned subjects. Preliminary data analysis is underway. Final analysis of the bed rest data, with the assistance of the NASA Johnson Space Center (JSC) Biostatistician, will be completed in Year 3. The final report will be submitted to the National Space Biomedical Research Institute (NSBRI), and at least one manuscript will be submitted to a peer-reviewed journal thereafter.</p> <p>Specific Aim II: To determine whether previous spaceflight experience or training in high performance jet aircraft predisposes astronauts to lower venous compliance and/or the development of the VIIP syndrome. Hypothesis 1: Vascular compliance in the head and neck will be higher in novice crewmembers compared to astronauts with previous flight experience (Astronaut Ground study) Hypothesis 2: Astronauts with training as high performance jet aircraft pilots will have lower vascular compliance, even preflight, than non-pilot astronauts and will have a higher incidence/severity of VIIP syndrome (Data Mining study).</p> <p>Astronaut Ground Study</p> <p>We have developed an Informed Consent Briefing to present to potential subjects and are working with International Space Station Medical Project (ISSMP) personnel to schedule the briefing to the Astronaut Office. We plan to recruit 8 astronauts that have never flown or astronaut candidates to participate in research at the Cardiovascular Laboratory at the NASA Johnson Space Center in Houston, TX.</p> <p>Data Mining Study</p> <p>We received full approval from all necessary boards to proceed with data release from Lifetime Surveillance of Astronaut Health (LSAH). We have received almost all of the requested data; data from 3 astronauts who have flown recently has yet to be delivered. With each data release from LSAH to the JSC Cardiovascular Laboratory, data were verified for validity and incorporated into the study's database. Final data analysis will be completed with the NASA JSC Biostatistician in Year 3. The final report will be submitted to NSBRI, and at least one manuscript will be submitted to a peer-reviewed publication thereafter.</p>
Task Description:	
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	<p>Improved understanding of the role of vascular compliance in the head and neck in the control of cerebral circulation may provide benefits for patients suffering from similar syndromes on Earth like Idiopathic Intracranial Hypertension (IIH).</p>
Task Progress:	<p>This study consists of 3 separate but interrelated studies.</p> <p>Data Mining: The data mining study is in progress. The JSC Institutional Review Board (IRB) approved the renewal of the data mining study (expiration date - December 31, 2015). The consent process has been completed. Initial data sets have been provided to the Principal Investigator team by Lifetime Surveillance of Astronaut Health (LSAH). We are in the process of preparing the data for analysis.</p> <p>Bed Rest: Eleven (7 younger men, 4 older men) of 20 planned subjects completed participation in this study before the closure of the Flight Analogs Research Unit at the University of Texas, Medical Branch (UTMB) in Galveston, TX on December 31, 2014. Due to the closure of the facility, we were not able to complete the 20 planned male subjects. Plasma volume, vascular measures (area and diameter of head and neck vessels among other ultrasound measures), and ocular measures (intraocular pressure, optical coherence tomography, and ocular ultrasound) were collected on all 11 men. We collected non-invasive internal jugular venous pressure using a novel device, VeinPress, in 6 of 11 subjects. Invasive left internal jugular venous pressure was measured using a catheter inserted into the internal jugular vein in 2 of these 6 during their pre-bed rest testing session.</p> <p>Ground: We recently renewed the IRB approval for this study (expiration - April 30, 2016). We are in the process of scheduling an Informed Consent Briefing to be presented to the astronaut corps. The International Space Station Medical Project (ISSMP) will assist with recruiting astronauts who have never flown or astronaut candidates.</p>
Bibliography Type:	Description: (Last Updated: 03/01/2018)