Task Book Report Generated on: 04/25/2024

Plants, Seven II Ph.D. Project Title: Effects of Long Duration Spaceflight on Venous and Arterial Compliance in Astronauts Division Name: Program/Discipline: RossBall Program/Discipline- RementShaddiscipline: John Agency Name: TechPort: No Human Research Program Elements: (I) HIC-Human Health Countameasures Human Research Program Elements: (I) HIC-Human Health Countameasures Human Research Program Risks: (I) SANS-Risk of Spaceflight Associated Neuro-occular Synthome (SANS) Space Biology Element: None Space Biology Element: None Space Biology Special Category: None PI Fumali: decouplant-Inframation None Space Biology Special Category: None PI Fumali: decouplant-Inframation None PI Fumali: decouplant-I	Fiscal Year:	FY 2015	Task Last Updated:	FY 07/07/2015	
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Space Biology Cross-Element Discipline: None PI Email: seven platts-107ms a. gov Fax: FY 281-244-5090 PI Organization Type: NASA CENTER Phone: 281483-8177 Organization Type: NASA Johnson Space Center PI Address 1: Cardiovascular Laboratory PI Address 2: Biomedical Research and Environmental Sciences Division PI Web Page: City: Houston State: TX Zip Code: 77058 Congressional District: 36 Comments: Project Type: FLIGHT,GROUND Solicitation / Funding 2012 Crew Health Source: NNJ122SA002N Start Date: 0601/2013 End Date: 0531/2017 No. of Post Does: 0 601/2013 End Date: 0531/2017 No. of Post Does: 0 No. of PhD Degrees: 0 No. of PhD Candidates: 0 No. of Master' Degrees: 0 No. of Master's Candidates: 0 No. of Master's Degrees: 0 No. of Master's Candidates: 0 Monitoring Center: NSBRI Contact Monitor: Contact Phone: Contact Email: Flight Program: Pre-Post Flight ISS pre- and postflight NOTE: End date changed to 5/31/2017 per NSBRI (Ed., 1/27/16) Ribeiro, Laura Christine (Wyle Laboratories) Westby, Christian (Universities Space Research Association, Columbia) Martin David (Wyle Laboratories) Plont-Singer, Michael (Wyle Laboratories) Westby, Christian (Universities Space Research Association, Columbia) Martin David (Wyle Laboratories) Plont-Singer, Michael (Wyle Laboratories) Noc 9-58-CA03402 Performance Goal No.:	Human Research Program Risks:	(1) SANS:Risk of Spaceflight Associated Neuro-ocular Syndrome (SANS)			
Discipline: Space Biology Special Category: None PI Email: PI Email: NASA CENTER NASA CENTER Phone: 281-483-8177 Organization Type: NASA Johnson Space Center PI Address 1: Cardiovascular Laboratory PI Address 2: Biomedical Research and Environmental Sciences Division PI Web Page: City: Houston State: TX Zip Code: 770.58 Congressional District: 36 Comments: Project Type: FLIGHT,GROUND Solicitation / Funding Source: NNo. of Post Docs: No. of Master's Candidates: No. of No. of Master's Candidates: No. of Bachelor's Candidates: Right Program: ProPost Flight ISS pre- and postflight NOTE: End date changed to 5/31/2017 per NSBRI (Ed., 1/27/16) Right Assignment: Right Assignment: Right Assignment: Right Assignment: Right Assignment: Right (Wyle Laboratories) Verlays (Ryle Laboratories) Verlays (Ryle Laboratories) Provinces Accounted to (Liniversities Space Research Association, Columbia) Marin, David (Wyle Laboratories) Places, Stater (Universities Space Research Association, Columbia) Narin, David (Wyle Laboratories) Places, Stater (Universities Space Research Association, Columbia) Narin, David (Wyle Laboratories) Places, Stater (Wyle Laboratories) Places, Stater (Wyle Laboratories) Proformance Goal No.:	Space Biology Element:	None			
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Zip Code: 77058 Congressional District: 36 Comments: Project Type: FLIGHT.GROUND Solicitation / Funding 2012 Crew Health Source: 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 Master's Candidates: 0 Monitoring Center: NSBRI Contact Monitor: Contact Phone: Contact Email: Flight Program: Pre/Post Flight ISS pre- and postflight NOTE: End date changed to 5/31/2017 per NSBRI (Ed., 1/27/16) Key Personnel Changes/Previous PI: Ribeiro, Laura Christine (Wyle Laboratories) Westby, Christian (Universities Space Research Association, Columbia) Martin, David (Wyle Laboratories) Westby-Christian (Universities Space Research Association, Columbia) Houtz-Snyder, Robert (Universities Space Research Association, Columbia) Stenger, Michael (Wyle Laboratories) Stenger, Michael (Wyle Laboratories) Stenger, Michael (Wyle Laboratories) Performance Goal No.:	PI Web Page:				
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Performance Goal No.:	COI Name (Institution):	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)			
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Task Book Report Generated on: 04/25/2024

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. 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.

Task Description:

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).

Astronaut Ground Study

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.

Data Mining Study

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.

Rationale for HRP Directed Research:

Research Impact/Earth Benefits:

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 Intrancranial Hypertension (IIH).

This study consists of 3 separate but interrelated studies.

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.

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 veni in 2 of these 6 during their pre-bed rest testing session.

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.

Bibliography Type:

Task Progress:

Description: (Last Updated: 03/01/2018)