

<b>Fiscal Year:</b>	FY 2017	<b>Task Last Updated:</b> FY 02/24/2017	
<b>PI Name:</b>	Zanello, Susana Ph.D.		
<b>Project Title:</b>	Multimodal Modeling towards Noninvasive Assessment of Intracranial Pressure in Weightlessness and Biomarker Identification of Predisposition to VIIP Syndrome		
<b>Division Name:</b>	Human Research		
<b>Program/Discipline:</b>			
<b>Program/Discipline--Element/Subdiscipline:</b>	HUMAN RESEARCH--Biomedical countermeasures		
<b>Joint Agency Name:</b>	<b>TechPort:</b>	No	
<b>Human Research Program Elements:</b>	(1) <b>HHC:</b> Human Health Countermeasures		
<b>Human Research Program Risks:</b>	(1) <b>SANS:</b> Risk of Spaceflight Associated Neuro-ocular Syndrome (SANS)		
<b>Space Biology Element:</b>	None		
<b>Space Biology Cross-Element Discipline:</b>	None		
<b>Space Biology Special Category:</b>	None		
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<b>PI Organization Type:</b>	NASA CENTER	<b>Phone:</b>	832-576-6059
<b>Organization Name:</b>	KBR/NASA Johnson Space Center		
<b>PI Address 1:</b>	Human Research Program Chief Scientist Office		
<b>PI Address 2:</b>			
<b>PI Web Page:</b>			
<b>City:</b>	Houston	<b>State:</b>	TX
<b>Zip Code:</b>	77058	<b>Congressional District:</b>	36
<b>Comments:</b>	NOTE (January 2021): PI now at KBR/NASA JSC as of December 2020. Previously at imec USA from June 2019-November 2020; NASA JSC (KBRwyle) from August 2017 until spring 2019. Prior to August 2017, PI was with Universities Space Research Association.		
<b>Project Type:</b>	FLIGHT	<b>Solicitation / Funding Source:</b>	2013-14 HERO NNJ13ZSA002N-ILSRA. International Life Sciences Research Announcement
<b>Start Date:</b>	04/01/2016	<b>End Date:</b>	07/05/2021
<b>No. of Post Docs:</b>	0	<b>No. of PhD Degrees:</b>	0
<b>No. of PhD Candidates:</b>	0	<b>No. of Master' Degrees:</b>	0
<b>No. of Master's Candidates:</b>	0	<b>No. of Bachelor's Degrees:</b>	0
<b>No. of Bachelor's Candidates:</b>	0	<b>Monitoring Center:</b>	NASA JSC
<b>Contact Monitor:</b>	Norsk, Peter	<b>Contact Phone:</b>	
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<b>Flight Program:</b>	ISS		
<b>Flight Assignment:</b>	NOTE: End date changed to 7/5/2021 per R. Schulte/HRP HHC element, due to PI move to KBR/NASA JSC management (Ed., 12/15/21) NOTE: End date changed to 1/1/2026; note also with PI move to imec USA-Florida, PI's 3 projects were combined into one grant, 80NSSC19K1666 ; however, reporting will be required individually, per HRP (Ed., 11/4/19) NOTE: End date changed to 9/30/2025 per HRP (Ed., 11/19/18)		
<b>Key Personnel Changes/Previous PI:</b>	NOTE: This project has been combined with "Invasive and Noninvasive ICP Monitoring and VIIP Biomarker Identification" (PI Dr Michael Williams). February 2017 report: Dr. James Fiedler (previous CoInvestigator) moved to another position and is no longer is working on the project.		
<b>COI Name (Institution):</b>	Scott, Jessica Ph.D. ( Universities Space Research Association ) Hu, Xiao Ph.D. ( University of California, San Francisco )		
<b>Grant/Contract No.:</b>	NNX16AH78G		

<b>Performance Goal No.:</b>	
<b>Performance Goal Text:</b>	
<b>Task Description:</b>	There is a clear need to investigate whether there is an association between intracranial pressure (ICP) increase and the Visual Impairment and Intracranial Pressure (VIIP) syndrome. The Non-Invasive ICP Framework (NICF) is a general approach for inferring ICP using noninvasive signals that are related to ICP. Leveraging multimodal noninvasive data from crew members to be collected in planned longitudinal experiments in flight will significantly improve the accuracy of this noninvasive ICP measurement tool. In addition, we will evaluate biomarkers in blood and urine of crew members, with the aim of investigating the molecular bases and genetic predisposition of developing VIIP syndrome. Overall, this study proposes the use of noninvasive measures plus biomarker discovery and validation as input to build a predictive model that will inform the likelihood of a given crew member of developing vision/neurological complications post flight.
<b>Rationale for HRP Directed Research:</b>	
<b>Research Impact/Earth Benefits:</b>	Investigating the propensity and molecular mechanisms associated with ICP increase in microgravity will yield valuable information applicable to similar conditions on Earth, contributing to the knowledge of why conditions such as idiopathic intracranial hypertension develop, and how to manage elevated ICP. Moreover, the improvement of the non-invasive algorithm for ICP estimation will be of utmost importance for the diagnosis and management of neurologic conditions with high ICP and traumatic brain injury.
<b>Task Progress:</b>	The activities within the first year of this project have been centered on its integration with a complementary study that aims to measure ICP directly in crew members in order to test the involvement of ICP increase in the pathophysiology of VIIP (Refer to "ZERO G AND ICP: INVASIVE AND NONINVASIVE ICP MONITORING OF ASTRONAUTS ON THE ISS", PI: Michael Williams (University of Washington)). This included discussions among investigators as well as consultation with an expert bioinformatics team. In addition, we have completed the design of a small study for the biomarker discovery portion by coordinating a pilot investigation in patients with idiopathic intracranial hypertension, which will validate the sample collection logistics and genomic methodological approaches to be used in the main stage of the project.
<b>Bibliography Type:</b>	Description: (Last Updated: 09/04/2023)
<b>Articles in Peer-reviewed Journals</b>	Theriot CA, Westby CM, Morgan JLL, Zwart SR, Zanello SB. "High dietary iron increases oxidative stress and radiosensitivity in the rat retina and vasculature after exposure to fractionated gamma radiation." npj Microgravity. 2016 May 5;2:16014. <a href="http://dx.doi.org/10.1038/npjmicrograv.2016.14">http://dx.doi.org/10.1038/npjmicrograv.2016.14</a> , May-2016
<b>Articles in Peer-reviewed Journals</b>	Taibbi G, Cromwell R, Zanello S, Yarbough P, Ploutz-Snyder R, Godley B, Vizzeri G. "Ocular outcomes comparison between 14- and 70-day head-down-tilt bed rest." Invest Ophthalmol Vis Sci. 2016 Feb;57(2):495-501. <a href="http://dx.doi.org/10.1167/iops.15-18530">http://dx.doi.org/10.1167/iops.15-18530</a> ; PubMed <a href="#">PMID: 26868753</a> ; PubMed Central <a href="#">PMCID: PMC4758300</a> , Feb-2016
<b>Articles in Peer-reviewed Journals</b>	Chakraborty SK, Khodor YL, Kitchen RR, Miller DL, Babcock KM, Manning KS, Lang SP, Tadigotla V, Yu W, Bershad E, Skog J, Zanello S. "Exosome based analysis for Space Associated Neuro-Ocular Syndrome and health risks in space exploration." npjMicrogravity. 2022 Sep 14;8:40. <a href="https://pubmed.ncbi.nlm.nih.gov/36104352">https://pubmed.ncbi.nlm.nih.gov/36104352</a> ; <a href="#">PMID: 36104352</a> ; <a href="#">PMCID: PMC9474550</a> , Sep-2022