

Fiscal Year:	FY 2020	Task Last Updated: FY 07/13/2020	
PI Name:	Zanello, Susana Ph.D.		
Project Title:	Multimodal Modeling towards Noninvasive Assessment of Intracranial Pressure in Weightlessness and Biomarker Identification of Predisposition to VIIP Syndrome		
Division Name:	Human Research		
Program/Discipline:			
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) 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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Organization Name:	KBR/NASA Johnson Space Center		
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Comments:	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.		
Project Type:	FLIGHT	Solicitation / Funding Source:	2013-14 HERO NNJ13ZSA002N-ILSRA. International Life Sciences Research Announcement
Start Date:	04/01/2016	End Date:	07/05/2021
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:	
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Flight Program:	ISS		
Flight Assignment:	<p>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)</p> <p>NOTE: End date changed to 9/02/2025 per NSSC and R. Schulte/HRP (Ed., 7/14/2020)</p> <p>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)</p> <p>NOTE: End date changed to 9/30/2025 per HRP (Ed., 11/19/18)</p>		
Key Personnel Changes/Previous PI:	NOTE: This project has been combined with "Invasive and Noninvasive ICP Monitoring and SANS (previously VIIP) Biomarker Identification" (PI Dr. Michael Williams). November 2019: Xiao Hu, Ph.D. is only CoInvestigator per HRP. February 2017 report: Dr. James Fiedler (previous CoInvestigator) moved to another position and is no longer working on the project.		
COI Name (Institution):	Hu, Xiao Ph.D. (University of California, San Francisco)		

Grant/Contract No.:	80NSSC19K1666 ; Internal Project ; NNX16AH78G
Performance Goal No.:	
Performance Goal Text:	
Task Description:	<p>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 [Ed. note July 2020: now referred to as Spaceflight Associated Neuro-ocular Syndrome (SANS)]. 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.</p>
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	<p>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.</p>
Task Progress:	<p>During this reporting period, we have continued the optimization of protocols in this study. In particular, we have completed an evaluation of the current flight-certified tubes used for urine collection on the International Space Station (ISS). We have demonstrated that the flight-certified urine collection tubes perform no differently from the standard urine collection tubes used in the regular research and clinical settings, and are compatible with the methods for exosome isolation, library construction, and RNA sequencing planned to be applied in this project.</p>
Bibliography Type:	Description: (Last Updated: 09/04/2023)