Task Book Report Generated on: 04/25/2024

Project Title: A Cime Expension and Histologic Approach to the Nauly of Cerebrospinal Flaid Preduction and Outllow in Hindlimb Incoments and Project Title: Birstion Name: Distrion Name: Burnan Research Program/Discipline: Program/Discipline: HUMAN RESEARCH-Biomedical countermeasures HUMAN RESEARCH-Biomedical countermeasures Human Research Program Edistric (I) HIIC-Human Headth Countermeasures Human Research Program Ristols: (I) MICHaunan Headth Countermeasures Human Research Program Ristols: (I) SANS-Risk of Spaceflight Associated Neuro-scalar Syndrome (SANS) Space Biology Element: None Space Biology Special Category: None PI Email: None Space Biology Special Category: None PI Email: Risknass Jahanan Space Ceater PI Address: Human Research Program Risks: Risknass Jahanan Space Ceater PI Address: Human Research Togramization Name: SRRNASS Jahanan Space Ceater PI Address: Human Research Program Risks: None State: TX Zip Code: None State: TX Zip Code: None State: TX Zip Code: None State: TX Zip Code: None State: TX Zip Code: OTORI (January 2021) Planow at KBRNASS NSC as of December 2009. Proviously at mice USA Brom Nume 2019-November 2009, NASA JSC (KBRveyle) from August 2019. Protein August 2017, Planow at Category: None of Dear December 2009. Proviously at mice USA Brom Nume 2019-November 2009, NASA JSC (KBRveyle) from August 2019 until spring 2019. Protein August 2017, Planow at Category: None of Moster's Candidates: Quality December 2009, NASA JSC (KBRveyle) from August 2019 until spring 2019. Protein August 2017, Planow at Category: None of Bachelor's Candidates: Quality December 2009, NASA JSC (KBRveyle) from August 2019 until spring 2019. Protein August 2017, Planow at Category: None of Moster's Candidates: Quality December 2009, Nash JSC (KBRveyle) from August 2017, Planow at Category: None of Bachelor's Candidates: Quality December 2009, Nash JSC (KBRveyle) from August 2019, Planow at Category: None of Bachelor's Candidates: Quality Program None	Fiscal Year:	FY 2018	Task Last Updated:	FY 08/01/2018
Division Name: Human Research Program/Divicipline- Element/Subdivicipline- Human Research Program Elements: (I) HHC-Human Heldth Countermeasures Human Research Program Elements: (I) SANS-Risk of Spaceflight Associated Neuro-scular Syndromic (SANS) Space Biology Flement: None Space Biology Special Category: None Pl Email: Subministry None Pl Email: Subministry None Pl Corganization Type: No NASA CENTER Phone: \$32-576-6059 Organization Name: KBR/NASA Johnson Space Center Pl Address 1: Human Research Program Chief Scientist Office Pl Address 2: Pl Human Research Program Chief Scientist Office Pl Web Page: City: Ilouston State: TX Zip Code: Congressional District MOTE (Innumy 2021): Pl now or KBR/NASA JSC as of Documber 2020 Previously at innec USA from Innec 2019-Nocember 2020 NASA RSC (KBRoyle) from August 2017 unil spring 2019. Pior to August 2017, Pl was with Universities Space Research Association Project Type: GROUND Solicitation / Funding 2018 Pior to August 2017, Pl was with Universities Space Research Association Project Type: GROUND Solicitation / Funding 2018 Pior to August 2017, Pl was with Universities Space Research Association No. of Past Docs: O No. of Phot Degrees: O No. of Phot	PI Name:	Zanello, Susana Ph.D.	•	
Program/Discipline: Program/Discipline-Element/Studicipline: IL/MAN RESEARCII-Biomedical countermeasures Joint Agency Name: Toch Port: No Human Research Program Elements: (1) HIC-Human Health Countermeasures Human Research Program Risks: (1) SANSRisk of Spaceflight Associated Neuro-ocular Syndrome (SANS) Space Biology Cross-Element: None Space Biology Cross-Element: None P1 Email: assam b zuerlio@meas gov Fax: FY P1 Camalization Type: No SA CENTER Phone: 82-576-6059 P1 Address 1: Haman Research Program Chief Scientist Office Tax P1 Address 2: P1 Address 1: Haman Research Program Chief Scientist Office P1 Address 1: House Search Program Chief Scientist Office State: TX Cly: Louison State: TX Organization Name: NOTE (January 2021): P1 now at KBR/NASA JSC as of December 2020; Proviously at innec USA from June 2019; November 2020; NASA JSC (KBR-Nyle) from August 2011 until spring 2019, P1 not to August 2017, P1 was with Universities Space Research Association. Project Type: GROUND Solicitation / Punding 2013 HERO NNIJ3ZSA002N-Crew Space Research Association. Project Type: GROUND N	Project Title:	A Gene Expression and Histologic Approach to the Study of Cerebrospinal Fluid Production and Outflow in Hindlimb		
Program/Discipline- Element/Subdiscipline- Element/Subdiscipline- Dianit Agency Name: TechPort: No	Division Name:	Human Research		
FlementsSubdiscipline: FlowArk RESEARCH - Bonnecical countermeasures Tech Port: No	Program/Discipline:			
Human Research Program Elements: (1) HIC-Human Health Countermeasures Human Research Program Risks: (1) SANS Risk of Spaceflight Associated Neuro-ocular Syndrome (SANS)		HUMAN RESEARCHBiomedical countermeas	pures	
Human Research Program Rislas: Clasans-Risk of Spaceflight Associated Neuro-ocular Syndrome (SANS)	Joint Agency Name:		TechPort:	No
Space Biology Cross-Element Space Biology Cross-Element Disciplina: Space Biology Special Category: None PI Email: Susuma b.zmello@mass.gov Fax: FY PI Organization Type: NASA CENTER Phone: 832-576-6059 Organization Name: KBRNASA Johnson Space Center PI Address 1: Human Research Program Chief Scientist Office PI Address 2: PI Web Page: City: Houston Type: None The Web Page: City: Johnston The January 2021: PI now at KBRNASA JSC as of December 2020. Previously at imee USA from June 2019-November 2020. PASA JSC (KBRwyle) from August 2017 until spring 2019. Prior to August 2017, PI was with Universities Space Research Association. Project Type: GROUND Solicitation / Funding Source: Health (FLAGSHIP & NSBRI) Start Date: 10/01/2015 Find Date: 9/030/2019 No. of Pat Does: 0 No. of Pat Does: 0 No. of Pat Does: 0 No. of Bachelor's Candidates: 0 Norte: Flight Assignment: NOTE: End date changed to 9/30/2019 per HRP (Ed., 11/19/18) Key Personnel Changes/Previous PI: Flight Assignment: NOTE: End date changed to 9/30/2019 per HRP (Ed., 11/19/18) Rivera, Adreama M.D. (Houston Methodist Hospital) Theriot, Corey Ph.D. (University of Texas Galveston) Chevez-Barrio, Patricia M.D. (The Methodist Hospital Research Instinct) Grant/Contract No.: NNX15AW48G	Human Research Program Elements:	(1) HHC :Human Health Countermeasures		
Space Biology Cross-Element Discipline: None PI Email: sussana b zanelloómasa aov Fax: FY PI Organization Type: NASA CENTER Phone: 832-576-6059 Organization Name: KBR/NASA Johnson Space Center PI Address 1: Human Research Program Chief Scientist Office PI Address 2: PI Web Page: City: Ilouston State: TX Zip Code: 77058 Congressional District: 36 Comments: NOTE (January 2021): PI now at KBR/NASA JSC as of December 2020. Previously at innee USA from June 2019-November 2020. NASA JSC (KBR-V)(s) from August 2017- until spring 2019- Prior to August 2017- PI was with Universities Space Research Association. Project Type: GROUND Solicitation / Funding 2013 HERO NNJ13ZSA002N-Crew No. of Post Docs: 0 No. of PhD Degrees: 0 No. of Post Docs: 0 No. of Master's Candidates: 0 Monitoring Center: NASA JSC Contact Email: Peter norskýmas nov Flight Assignment: NOTE: End date changed to 9/30/2019 per IIRP (Ed., 11/19/18) Key Personnel Changes/Previous PI: Rivera, Adreana M.D. (Houston Methodist Hospital) Theriot, Corey Ph.D. (University of Texas Galveston) Cheeves/Barrios, Patricia M.D. (The Methodist Hospital) Theriot, Corey Ph.D. (University of Texas Galveston) Cheeves/Barrios, Patricia M.D. (The Methodist Hospital) Theriot, Corey Ph.D. (University of Texas Galveston) Cheeves/Barrios, Patricia M.D. (The Methodist Hospital) Theriot, Corey Ph.D. (University of Texas Galveston) Cheeves/Barrios, Patricia M.D. (The Methodist Hospital) Theriot Cortex of Monitoria (Corey Ph.D. (University of Texas Galveston) Cheeves/Barrios, Patricia M.D. (The Methodist Hospital) Theriot Cortex of Monitoria (Corey Ph.D. (University of Texas Galveston)	Human Research Program Risks:	(1) SANS:Risk of Spaceflight Associated Neuro-C	ocular Syndrome (SANS)	
Space Biology Special Category: None Space Biology Special Category: NASA CENTER Phone: 832-576-6059	Space Biology Element:	None		
PI Email: PI Corganization Type: NASA CENTER Phone: 832-576-6059 Organization Name: KBR/NASA Johnson Space Center PI Address 1: Human Research Program Chief Scientist Office PI Address 2: PI Web Page: City: Houston State: TX Zip Code: 77058 Congressional District: 36 NOTE (January 2021): PI now at KBR/NASA JSC as of December 2020. Previously at imee 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: GROUND GROUND Solicitation / Funding 2013 HERO NNU13ZSA002N-Crew Source: Health (FLAGSHIP & NSBRI) Start Date: 10012015 End Date: 00 No. of PhD Degrees: 0 No. of Post Docs: 0 No. of Master' Degrees: 0 No. of Master's Candidates: 0 No. of Master' Degrees: 0 No. of Master's Candidates: 0 No. of Master's Candidates: 0 No. of Bachelor's Candidates: 0 No. of Bachelor's Candidates: 0 No. of Bachelor's Candidates: 0 Monitoring Center: NASA JSC Contact Monitor: Norsk, Peter Contact Email: Peternorsk@nasa.gov Flight Program: Flight Assignment: NOTE: End date changed to 9/30/2019 per HRP (Ed., 11/19/18) Key Personnel Changes/Previous PI: COI Name (Institution): Rivera, Adreana M.D. (Houston Methodist Hospital) Theriot, Corey Ph.D. (University of Texas Galveston) Chevez-Barrios, Particia M.D. (The Methodist Hospital Research Institute) Grant/Contract No.: NNX15AW48G	1	None		
Pl Organization Type: NASA CENTER Phone: 832-576-6059 Organization Name: KBR/NASA Johnson Space Center Pl Address 1: Human Research Program Chief Scientist Office Pl Address 2: Pl Web Page: City: Houston State: TX Zip Code: 77058 Congressional District: 36 Comments: NOTE (January 2021): Pl now at KBR/NASA JSC as of December 2020. Previously at imee USA from June 2019-November 2020: NASA JSC (KBRwyle) from August 2017 until spring 2019. Prior to August 2017, Pl was with Universities Space Research Association. Project Type: GROUND Solicitation / Funding 2013 HERO NNJ13ZSA002N-Crew John Conference of the Conference of	Space Biology Special Category:	None		
Organization Name: KBR/NASA Johnson Space Center PI Address 1: Human Research Program Chief Scientist Office PI Address 2: PI Web Page: City: Houston State: TX Zip Code: 77058 Congressional District: 36 Comments: 2019-November 2020; NASA JSC (KBRNyle) from August 2017 until spring 2019. Prior to August 2017, PI was with Universities Space Research Association. Project Type: GROUND Solicitation / Funding 2018 HERO NXU13ZSA002X-Crew Health (FLACSHIP & NSBRI) Start Date: 10.01/2015 End Date: 09/30/2019 No. of PhD Candidates: 0 No. of Master' Degrees: 0 No. of PhD Candidates: 0 No. of Master' Degrees: 0 No. of Master's Candidates: 0 No. of Master' Degrees: 0 No. of Bachelor's Candidates: 0 No. of Bachelor's Candidates: 0 Monitoring Center: NASA JSC Contact Monitor: Norsk, Peter Contact Phone: Contact Email: Peter norsk@nass.gov Flight Program: Flight Assignment: NOTE: End date changed to 9/30/2019 per HRP (Ed., 11/19/18) Key Personnel Changes/Previous PI: COI Name (Institution): Rivera, Adreana M.D. (Houston Methodist Hospital) Theriot, Corey Ph.D. (University of Texas Gialveston) Cheve-Parricy, Parricia M.D. (The Methodist Hospital) Research Institute) Grant/Contract No.: NNX15AW48G Performance Goal No.:	PI Email:	susana.b.zanello@nasa.gov	Fax:	FY
PI Address 1:	PI Organization Type:	NASA CENTER	Phone:	832-576-6059
PI Address 2:	Organization Name:	KBR/NASA Johnson Space Center		
Pl Web Page: City:	PI Address 1:	Human Research Program Chief Scientist Office		
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Zip Code: 77058 Congressional District: 36 NoTE (January 2021): PI now at KBR/NASA JSC as of December 2020. Previously at imee 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: GROUND Solicitation / Funding 2013 HERO NNJ13ZSA002N-Crew Health (FLAGSHIP & NSBRI) Start Date: 10/01/2015 End Date: 09/30/2019 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 Master' Degrees: 0 No. of Master's Candidates: 0 Monitoring Center: NASA JSC Contact Monitor: Norsk, Peter Contact Phone: Contact Email: Peter morsk@nasa.gov Flight Program: Flight Assignment: NOTE: End date changed to 9/30/2019 per HRP (Ed., 11/19/18) Key Personnel Changes/Previous PI: COI Name (Institution): Rivera, Adreana M.D. (Houston Methodist Hospital) Theriot, Corey Ph.D. (University of Texas Galveston) Chevez-Barrios, Patricia M.D. (The Methodist Hospital Research Institute) Grant/Contract No.: NNX15AW48G Performance Goal No.:	PI Web Page:			
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Source: Health (FLAGSHIP & NSBRI) Start Date: 10/01/2015 End Date: 09/30/2019 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 Master' Degrees: 0 No. of Master's Candidates: 0 Monitoring Center: NASA JSC Contact Monitor: Norsk, Peter Contact Phone: Contact Email: Peter.norsk@nasa.gov Flight Program: Flight Assignment: NOTE: End date changed to 9/30/2019 per HRP (Ed., 11/19/18) Key Personnel Changes/Previous PI: COI Name (Institution): Rivera, Adreana M.D. (Houston Methodist Hospital) Theriot, Corey Ph.D. (University of Texas Galveston) Chevez-Barrios, Patricia M.D. (The Methodist Hospital Research Institute) Grant/Contract No.: NNX15AW48G Performance Goal No.:	Comments:	2019-November 2020; NASA JSC (KBRwyle) from August 2017 until spring 2019. Prior to August 2017, PI was with		
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No. of PhD Candidates: 0 No. of Master's Candidates: 0 Monitoring Center: NASA JSC Contact Monitor: Norsk, Peter Contact Phone: Contact Email: Peter.norsk@nasa.gov Flight Program: Flight Assignment: NOTE: End date changed to 9/30/2019 per HRP (Ed., 11/19/18) Key Personnel Changes/Previous PI: COI Name (Institution): Rivera, Adreana M.D. (Houston Methodist Hospital) Theriot, Corey Ph.D. (University of Texas Galveston) Chevez-Barrios, Patricia M.D. (The Methodist Hospital Research Institute) Grant/Contract No.: NNX15AW48G Performance Goal No.:	Start Date:	10/01/2015	End Date:	09/30/2019
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No. of Bachelor's Candidates: No. of Bachelor's Candidates: Norsk, Peter Contact Monitor: Norsk, Peter Contact Phone: Contact Email: Peter.norsk@nasa.gov Flight Program: Flight Assignment: NOTE: End date changed to 9/30/2019 per HRP (Ed., 11/19/18) Key Personnel Changes/Previous PI: COI Name (Institution): Rivera, Adreana M.D. (Houston Methodist Hospital) Theriot, Corey Ph.D. (University of Texas Galveston) Chevez-Barrios, Patricia M.D. (The Methodist Hospital Research Institute) Grant/Contract No.: NNX15AW48G Performance Goal No.:	No. of PhD Candidates:	0	No. of Master' Degrees:	0
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Flight Assignment: NOTE: End date changed to 9/30/2019 per HRP (Ed., 11/19/18) Key Personnel Changes/Previous PI: COI Name (Institution): Rivera, Adreana M.D. (Houston Methodist Hospital) Theriot, Corey Ph.D. (University of Texas Galveston) Chevez-Barrios, Patricia M.D. (The Methodist Hospital Research Institute) Grant/Contract No.: NNX15AW48G Performance Goal No.:	Contact Monitor:	Norsk, Peter	Contact Phone:	
Flight Assignment: NOTE: End date changed to 9/30/2019 per HRP (Ed., 11/19/18) Key Personnel Changes/Previous PI: COI Name (Institution): Rivera, Adreana M.D. (Houston Methodist Hospital) Theriot, Corey Ph.D. (University of Texas Galveston) Chevez-Barrios, Patricia M.D. (The Methodist Hospital Research Institute) Grant/Contract No.: NNX15AW48G Performance Goal No.:	Contact Email:	Peter.norsk@nasa.gov		
Key Personnel Changes/Previous PI: COI Name (Institution): Rivera, Adreana M.D. (Houston Methodist Hospital) Theriot, Corey Ph.D. (University of Texas Galveston) Chevez-Barrios, Patricia M.D. (The Methodist Hospital Research Institute) Grant/Contract No.: NNX15AW48G Performance Goal No.:	Flight Program:			
Rivera, Adreana M.D. (Houston Methodist Hospital) Theriot, Corey Ph.D. (University of Texas Galveston) Chevez-Barrios, Patricia M.D. (The Methodist Hospital Research Institute) Grant/Contract No.: NNX15AW48G Performance Goal No.:	Flight Assignment:	NOTE: End date changed to 9/30/2019 per HRP ((Ed., 11/19/18)	
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Performance Goal No.:	COI Name (Institution):	Theriot, Corey Ph.D. (University of Texas Galve	eston)	
	Grant/Contract No.:	NNX15AW48G		
Performance Goal Text:	Performance Goal No.:			
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Task Book Report Generated on: 04/25/2024

Task Description:	The etiology of the Spaceflight-Associated Neuro-Ocular Syndrome (SANS) (formerly called Visual Impariment Intracranial Pressure) is unknown. It is hypothesized that weightlessness-induced cephalad fluid shift, possibly associated with elevated intracranial pressure (ICP), may play a critical role. Cerebrospinal fluid (CSF) dynamics changes may be involved in the ICP increase. Leveraging on an existing hindlimb suspension (HS) analog in rats, we propose to study the molecular aspects of CSF production and outflow modulation as a result of HS in the tissues involved in these two processes of CSF dynamics, namely choroid plexus (CP) and arachnoid granulations (AG), respectively. On available tissue shared from the parent animal experiment, we will perform differential gene expression profiling in the CP and AG of rats subjected to HS and their normal posture controls. In addition, we will compare the ultrastructure of the CP and AG and the histologic localization and distribution of putative targets implicated in CSF dynamics (aquaporins and cellular junction proteins) of the CP and the endothelial cell layer of the venous sinuses. An anticipated product of this study is the reduction of the uncertainty in the likelihood or consequence of the SANS risk by gaining a study tool (validated animal model) and knowledge on the molecular basis of the biological processes involved in CSF dynamics changes generated by HS.
Rationale for HRP Directed Research	1:
Research Impact/Earth Benefits:	By understanding the processes associated with fluid shift and its concomitant increase in intracranial pressure (ICP), we will gain clues to mitigate and reduce the impact of increased ICP in disease conditions like idiopathic intracranial hypertension and traumatic brain injury.
Task Progress:	A NASA-funded study using the hindlimb suspension (HS) analog in rats to model the physiological changes observed in the Spaceflight-Associated Neuro-Ocular Syndrome (SANS) was conducted. Animal experimentation has been completed, and sample and data analysis is ongoing. The project proposes to study the molecular bases of cerebrospinal fluid (CSF) production and outflow, and their modulation as a result of HS, bringing a molecular and histologic approach to investigate genome wide expression changes in the arachnoid granulations or villi (AG/AV) and choroid plexus (CP) of HS rats compared to rats in normal posture. To date, transmission electron microscopy (TEM) has been performed in coronal microsections of the brain containing the CP and AV, and laser capture microdissection of the CP and AV is being conducted in order to extract RNA from these specialized areas.
Bibliography Type:	Description: (Last Updated: 09/04/2023)
Articles in Peer-reviewed Journals	Zanello SB, Tadigotla V, Hurley J, Skog J, Stevens B, Calvillo E, Bershad E. "Inflammatory gene expression signatures in idiopathic intracranial hypertension: Possible implications in microgravity-induced ICP elevation." npj Microgravity. 2018 Jan 11;4(1):1. https://doi.org/10.1038/s41526-017-0036-6 ; PubMed PMCID: PMC5764966 , Jan-2018
Articles in Peer-reviewed Journals	Cromwell RL, Scott JM, Downs M, Yarbough PO, Zanello SB, Ploutz-Snyder L. "Overview of the NASA 70-day Bed Rest Study." Med Sci Sports Exerc. 2018 Sep;50(9):1909-19. Epub 2018 Mar 22. https://doi.org/10.1249/MSS.000000000000001617 ; PubMed PMID: 29570535 , Sep-2018