P1 Name: Baser, Mathias M.D. Ph.D. Project Title: Long-Term Brain Structural and Functional Consequences of SpaceIllight Program/Dicipilies:	Fiscal Year:	FY 2022	Task Last Updated:	EV 01/14/2022
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None Space Biology Cross-Element Discipline: None Space Biology Special Category: None PI Email: basner//penimedicine.upenn.edu Fax: FY Organization Type: UNIVERSITY Phoe: 215-573-5866 Organization Name: University of Pennsylvania Image: Special Category: 215-573-5866 PI Address 1: Department of Psychiatry, Division of Sleep and Chronobiology Image: Special Category: Image: Special Category: PI Address 2: 423 Service Dr, 1013 Blockley Hall Image: Special Category: Image: Special Category: Image: Special Category: PI Address 2: 423 Service Dr, 1013 Blockley Hall Image: Special Category:	Human Research Program Risks:	(2) SANS:Risk of Spaceflight Associated Neuro-ocular Syndrome (SANS)		
Discipline: Note Space Biology Special Category: None PI Email: hsaner@neumedicine.upenn.edu Fax: FY PI Organization Type: UNIVERSITY Phoe: 215-573-5866 Organization Type: Department of Psychiatry, Division of Sleep and Chronobiology 215-573-5866 PI Address 1: Department of Psychiatry, Division of Sleep and Chronobiology Image: Constraint of Psychiatry, Division of Sleep and Chronobiology PI Address 2: Papartment of Psychiatry, Division of Sleep and Chronobiology Image: Constraint of Psychiatry, Division of Sleep and Chronobiology PI Web Page: Image: Constraint of Psychiatry, Division of Sleep and Chronobiology Paint of Psychiatry, Division of Sleep and Chronobiology Zip Code: Pinladelphia State: PA Zip Code: Image: Constraint of Psychiatry, Division of Sleep and Chronobiology 2 Project Type: Pinladelphia State: PA Project Type: GROUND Solicitation findermace, and Space Constraints, Solicitation findermace, and Space Constrainthege: Solicitation findermace, and Space Constrainthege: S	Space Biology Element:	None		
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Organization Name University of Pennsylvania PI Address 1: Department of Psychiatry, Division of Sleep and Chronobiology PI Address 2: 423 Service Dr, 1013 Blockley Hall PI Web Page: Image: Provide Page City: Pilladelphia Jp Code: 19104-4209 Comments: 2019-2020 HERO Project Type: GROUND GROUND Solicitation / District Vandation: 2019-2020 HERO Solicitation / District Solicitation / District Performance, and Space Solicitation / District No. of Photones: 0 0 No. of Photones: 0 0 No. of Photones: 0 No. of Bachelor's Degrees: No. of Bachelor's Candidates: 0 No. of Solicitation / Distric	PI Email:	basner@pennmedicine.upenn.edu	Fax:	FY
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	Key Personnel Changes/Previous PI:			

COI Name (Institution):	 Dinges, David Ph.D. (University of Pennsylvania) Gunga, Hanns-Christian M.D. (Charite - Universitatsmedizin Berlin, Germany) Gur, Ruben Ph.D. (The Trustees of the University of Pennsylvania) Hartley, Tom Ph.D. (University of York, United Kingdom) Kuehn, Simone Ph.D. (Max Planck Institute for Human Development, Berlin, Germany) Riecke, Bernhard Ph.D. (Simon Fraser University, Canada) Roalf, David Ph.D. (University of Pennsylvania) Bell, Suzanne Ph.D. (NASA Johnson Space Center) Stangl, Matthias Ph.D. (University of California, Los Angeles) Whiting, Sara Ph.D. (German Center for Neurodegenerative Diseases, Germany) Stahn, Alexander Ph.D. (Charite - Universitatsmedizin Berlin, Germany)
Grant/Contract No.:	80NSSC21K1698
Performance Goal No.:	
Performance Goal Text:	
Task Description:	Magnetic Resonance Imaging (MRI) of the brain before and immediately following long-duration International Space Station (ISS) flights as well as Antarctic winter-over missions have revealed structural changes, but the time course of recovery and clinical significance remain unclear. This international proposal will "determine if exposure to long-duration spaceflight leads to neural structural alterations and if this remodeling impacts cognitive and functional performance" (HRP Gap BMed-107). To accomplish this, we propose to leverage data from our already funded integrated 1-Year Mission Project (i1YMP) and extend the follow-up period for N=20 astronauts on 6- and 12-month ISS missions to 3-years post-flight (this follow-up period can be extended should structural and functional brain changes not be fully reversible within 3 years after return from the ISS). Measures of cognitive function include the Cognition test battery (developed by NASA Principal Investigator Dr. Basner and his team), a Spatial Cognition test battery (developed by German Aerospace Center (DLR)/European Space Agency (ESA) Principal Investigator Dr. Stahn and his team), and NASA's standard WinSCAT test battery (which currently is last performed 30 days post-flight). These tests will be performed up to 7 times post-flight, which will provide an exceptional resolution in mapping the recovery time course of any observed decrements in cognitive performance across a wide range of cognitive databases. In our i1YMP, we perform structural and functional MRI scans in astronauts before and immediately after the mission. These scans include, but go beyond, protocols that were the basis for several recent publications that observed structural brain changes in astronauts immediately post-flight and can thus augment these data sets. In our i1YMP, astronauts perform are functional MRI version of Cognition (Project A) as well as a complex Mars navigation task (Project B) in the scanner, which allows us to link task-specific changes in brain plasticity with
Rationale for HRP Directed Research	:
Research Impact/Earth Benefits:	Detailed astronaut follow-up after return from spaceflight has historically been limited to a few weeks, which prevents conclusions about long-term health consequences of astronauts, especially after longer stays in space. This study will follow astronauts for up to 5 years after >=6 months missions. The research partially translates to similar stressful long-term exposure situations on Earth.
Task Progress:	This project is being combined with the work of three other PIs who responded to the same solicitation with independent proposals. During this reporting period, the protocols and aims from all four PIs are being integrated into a revised integrated proposal that will be delivered to NASA Human Health Countermeasures (HHC) and NASA Human Factors and Behavioral Performance (HFBP) Element scientists in January 2022. To reach this goal, the research team determined how to combine MRI sessions from multiple PIs, identified and removed overlapping procedures, and made substantial progress towards having a single, integrated budget.
Bibliography Type:	Description: (Last Updated: 04/05/2024)