Fiscal Year:	FY 2017	**Task Last Updated:**	FY 01/20/2017
PI Name:	Macias, Brandon Ph.D.		
Project Title:	Prospective Observational Study of Ocular Health in ISS Crews		
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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PI Organization Type:	NASA CENTER	**Phone:**	281-483-2026
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Zip Code:	77058	**Congressional District:**	36
Comments:	NOTE: Became civil servant fall 2020; previously KBR/NASA Johnson Space Center. Prior to that until 2016, was at the University of California, San Diego.		
Project Type:	FLIGHT	**Solicitation / Funding Source:**	Directed Research
Start Date:	01/06/2017	**End Date:**	09/30/2019
No. of Post Docs:		**No. of PhD Degrees:**	
No. of PhD Candidates:		**No. of Master' Degrees:**	
No. of Master's Candidates:		**No. of Bachelor's Degrees:**	
No. of Bachelor's Candidates:		**Monitoring Center:**	NASA JSC
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Flight Program:	ISS		
Flight Assignment:	NOTE: End date changed to 9/30/2019 (original end date was 11/16/2017) per PI (Ed., 10/9/18) NOTE: End date changed to 9/30/2018 (original end date was 11/16/2017) per A. Allcorn and PI (Ed., 10/11/17)		
Key Personnel Changes/Previous PI:			
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Grant/Contract No.:	Directed Research		
Performance Goal No.:			

Performance Goal Text:	
Task Description:	NOTE: Continuation of "Prospective Observational Study of Ocular Health in ISS Crews" with Dr. Christian Otto as Principal Investigator due to Otto's move in January 2017. The International Space Station (ISS) Ocular Surveillance Protocol aims to systematically gather physiological data to characterize the Risk of Microgravity-Induced Visual Impairment/Intracranial Pressure (VIIP) on crewmembers assigned to a 6 month ISS increment. The data collected will mirror Medical Requirements Integration Documents (MRID) requirements and testing performed during annual medical exams. The frequency of in-flight and postflight testing will be increased to more accurately assess changes that occur in the visual, vascular, and central nervous systems upon exposure to microgravity and induction of fluid shifting. Monitoring in-flight changes, in addition to postflight recovery, is the main focus of this protocol. A data sharing plan with Medical Operations will reduce redundancy of data acquisition. Preflight, in-flight, and postflight measures include: tonometry, ocular ultrasound, fundoscopy, and visual acuity; while magnetic resonance imaging (MRI), optical coherence tomography (OCT), and bio-microscopy will be captured preflight and postflight exclusively. Two additional, non-MRID measures, blood pressure and cardiac output, will be collected preflight, in-flight, and postflight to assess vascular compliance. Data collection will begin one year prior to flight, continue in-flight approximately every 30 days, and through to one year postflight. In circumstances where abnormalities may persist beyond one year, postflight data will continue to be collected, but as per the MRID requirements (MedB 1.10) and VIIP clinical practice guidelines. Expected Outcomes 1. It is expected that some crewmembers will experience meaningful and detectable in-flight changes in at least one or more of the following: visual acuity, intraocular pressure, optic disc edema (papilledema), chorioretinal folds, optic nerve sheath distention, optic nerve tortuosity, optic nerve-to-sheath ratio, globe flattening, and retinal “cotton-wool spots.” 2. It is expected that some crewmembers will experience meaningful pre- to postflight changes in one or more of the following: visual acuity, intraocular pressure, optic disc edema (papilledema), chorioretinal folds, optic nerve sheath distention, optic nerve tortuosity, optic nerve-to-sheath ratio, globe flattening, retinal “cotton-wool spots”, vascular compliance, CSF (cerebral spinal fluid) velocity through the aqueduct of Sylvius, and retinal nerve fiber layer. 3. It is expected that if an in-flight or postflight measure deviates from preflight baseline measures, it may have a prolonged recovery to baseline (preflight values) that is positively associated with severity. Specific Aims For all measured variables and using currently available on-orbit methodologies, this study has the following specific aims: 1. Characterize the nature of in-flight visual, vascular, and central nervous system changes during six months exposure to microgravity. 2. Document changes from pre- to postflight. 3. Delineate the interaction between individual susceptibility and severity of symptoms. 4. If changes occur, establish the postflight time course for recovery to baseline. See also: http://www.nasa.gov/
Rationale for HRP Directed Research:	This research is directed because it contains highly constrained research and there is insufficient time. This research is highly constrained because it is proposing additional data collections of MRID measures pre-, in-, and postflight. Since the co-investigative team collects the MRID data, they are the best source to collect this data as well. Due to the visibility of this risk, there is pressure to characterize the visual changes associated with spaceflight in order to begin to identify the underlying cause. The results of this study will help define and frame the new Risk of Microgravity-Induced Visual Impairment/Intracranial Pressure.
Research Impact/Earth Benefits:	Terrestrial Benefits 1. The VIIP syndrome has similarities to terrestrial medical conditions such as glaucoma, Normal Pressure Hydrocephalus (NPH), Idiopathic Intracranial Hypertension (IIH), and high-altitude related illnesses 2. Advances in the tools, techniques, and countermeasures that NASA develops in its VIIP research will benefit these terrestrial clinical populations 3. Identifying the cause(s) and risk factors for the VIIP syndrome will also inform the cause(s) and risk factors for these terrestrial conditions.
Task Progress:	NOTE: Continuation of "Prospective Observational Study of Ocular Health in ISS Crews" with Dr. Christian Otto as Principal Investigator due to Dr. Otto's move in January 2017. See that project for previous reporting.
Bibliography Type:	Description: (Last Updated: 04/04/2024)