Fiscal Year:	FY 2023	**Task Last Updated:**	FY 11/04/2022
PI Name:	Ocorr, Karen Ph.D.		
Project Title:	Integrated Physiological Responses of CNS and Muscle in Drosophila and C. elegans Along a Gravity Continuum		
Division Name:	Space Biology		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:			
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	None		
Human Research Program Risks:	None		
Space Biology Element:	(1) Cell & Molecular Biology (2) Animal Biology: Invertebrate		
Space Biology Cross-Element Discipline:	(1) Musculoskeletal Biology (2) Neurobiology		
Space Biology Special Category:	None		
PI Email:	kocorr@sbpdiscovery.org	**Fax:**	FY
PI Organization Type:	NON-PROFIT	**Phone:**	858-692-0051
Organization Name:	Sanford Burnham Prebys Medical Discovery Institute		
PI Address 1:	Center for Genetic Disorders and Aging Research		
PI Address 2:	10901 N Torrey Pines Rd		
PI Web Page:			
City:	La Jolla	**State:**	CA
Zip Code:	92037-1005	**Congressional District:**	49
Comments:			
Project Type:	FLIGHT,GROUND	**Solicitation / Funding Source:**	2020 Space Biology NNH20ZDA001N-SB E.12. Flight/Ground Research
Start Date:	01/01/2022	**End Date:**	12/31/2024
No. of Post Docs:	1	**No. of PhD Degrees:**	
No. of PhD Candidates:		**No. of Master' Degrees:**	
No. of Master's Candidates:	1	**No. of Bachelor's Degrees:**	1
No. of Bachelor's Candidates:	1	**Monitoring Center:**	NASA ARC
Contact Monitor:	Griko, Yuri	**Contact Phone:**	650-604-0519
Contact Email:	Yuri.V.Griko@nasa.gov		
Flight Program:	ISS		
Flight Assignment:			
Key Personnel Changes/Previous PI:	None		
COI Name (Institution):	Iyer, Janani Ph.D. (NASA Ames Research Center) Szewczyk, Nathaniel Ph.D. (Ohio University) Costes, Sylvain Ph.D. (NASA Ames Research Center) Mhatre, Siddhita Ph.D. (NASA Ames Research Center)		
Grant/Contract No.:	80NSSC22K0278		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Our studies will use the fruit fly Drosophila and the worm Caenorhabditis elegans (C. elegans) to identify conserved mechanisms underlying the oxidative stress response to altered gravity. Spaceflight induces alterations in somatic/cardiac muscle, as well as in the brain. Many of these changes mirror those induced by long-term bed-rest on Earth and with age. We will use functional, structural, and molecular biological techniques to identify common genetic and molecular components that mediate the effect of microgravity, lunar gravity, and Mars gravity on organ function. The use of two different genetic model organisms will allow us to identify common targets across species that can be exploited to mitigate negative health effects of long duration space habitation and perhaps provide therapies to combat muscle wasting and neurodegeneration on Earth. We will also compare the changes in these organisms with published changes in humans subjected to bed-rest and spaceflight.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	Understanding the effects of reduced gravities on mitochondrial structure/function and protein homeostasis will provide targets for countermeasures to aid astronauts' muscle and neuronal function for extended stays on the lunar surface and eventually on Mars. It will also provide insights into the cellular mechanisms underlying sarcopenia and muscle wasting-thus providing targets for clinical therapies.
Task Progress:	We have met with our NASA managerial team and completed the Experiment Requirements Document. This is an important first step to identify hardware and other requirements that will be needed for flight. In co-ordination with Co-Investigators (Co-Is) at NASA Ames Research Center (NASA - Ames), we are generating and testing the fly reagents needed for the experiments. These include a line of flies with a mitochondrial Green Fluorescent Protein (GFP) reporter and an ATG8-mCherry reporter that will allow us to monitor mitochondrial structure and autophagy respectively. We are also working to generate a C. elegans line with equivalent reporters. Toward this end we have brought on board a collaborator, Assistant Professor Caroline Kumsta, who will provide one of the reagents for the C. elegans experiment and will assist in combining that line with an available mitochondrial reporter line. We are conducting preliminary tests to see if we will be able to adapt new state-of the art technology to the gene expression portion of the experiment. Toward this end we have brought on board a second collaborator, Research Assistant Professor Georg Vogler, to explore the possibility of using a new single cell RNA sequencing technology that is becoming a new standard for gene expression technology.
Bibliography Type:	Description: (Last Updated: 11/22/2023)