Planen: Idada, Megumi Ph.D. Project Title: Combined Effects of Simulated Microgravity and Space Radiation on Human Cells Division Name: Space Biology Program/Discipline: Space Biology Program/Discipline: Image: Space Biology Joint Agency Name: No Human Research Program Element None Space Biology Conse-Element: 1) Cell & Molecular Biology Ci Animal Biology: Verebrate Image: Space Biology Conse-Element: Space Biology Special Category (1) Cell & Molecular Biology Piterbank: Space Giology Special Category Pl Famil: mediad@promusedu Pl Address 1: College of Arts and Sciences, PO BOX 519, MS-2230, New Science Bidg Pl Address 2: Image: Im				
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No. of Master's Candidates: No. of Bachelor's Degrees:	No. of Master's Candidates:		No. of Bachelor's Degrees:	
No. of Bachelor's Candidates: Monitoring Center: NASA KSC	No. of Bachelor's Candidates:		Monitoring Center:	NASA KSC
Contact Monitor: Zhang, Ye Contact Phone: 321-861-3253	Contact Monitor:	Zhang, Ye	Contact Phone:	321-861-3253
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Flight Program:	Flight Program:			
Flight Assignment:	Flight Assignment:			
Key Personnel Changes/Previous PI:	Key Personnel Changes/Previous PI:			
COI Name (Institution):Wang, Jing Ph.D. (University of Texas MD Anderson Cancer Center)Coi Name (Institution):Takahashi, Akihisa Ph.D. (Gunma University Heavy Ion Medical Center, Japan)Fujiwara, Keigi Ph.D. (University of Texas MD Anderson Cancer Center)	COI Name (Institution):	Takahashi, Akihisa Ph.D. (Gunma Univer	sity Heavy Ion Medical Center,	
Grant/Contract No.: 80NSSC19K0133	Grant/Contract No.:	80NSSC19K0133		
Performance Goal No.:	Performance Goal No.:			
Performance Goal Text:	Performance Goal Text:			

Rationale for HRP Directed Research: Research Impact/Earth Benefits: Task Progress: New project for FY2019. Bibliography Type: Description: (Last Updated: 06/26/2025)	Task Description:	 Space radiation and microgravity are two major environmental stressors for human in space travel. One of the fundamental questions in space biology research is whether the combined effects of microgravity and exposure to cosmic radiation are synergistic. While studies addressing this question have been carried out for half a century in space or using simulated microgravity on the ground, the reported results are conflicting. Although the reason for the variation in results is not known, it is possible that it may be due to the diversity of biological systems used but more importantly to the experimental designs and hardware used in these studies. For the assessment and management of human health risks in future Moon and Mars Missions, it is necessary to obtain more basic data on the molecular and cellular responses to combined effects of radiation and microgravity. To establish a firm baseline database, we propose to undertake a systematic study on cultured mammalian cells' responses to the simultaneous insult of radiation and microgravity (both immediate and long term) to elucidate the molecular biological bases for the assessment and management of human health risks in space. Recently Dr. Takahashi, co-investigator of this proposal, has developed microgravity-irradiation systems consisting of a 3D elinostat synchronized to the carbon-ion or X-ray irradiation systems. Our new experiments. Gunma University Heavy Ion Medical Center is the only facility in the world where we can expose samples to high-linear energy transfer (LF) irradiation as well as low-LET irradiation under the simulated microgravity condition (i.e., without interrupting clinostat rotation). Our preliminary data obtained from the use of this new device on gene expression in human fibroblasts show that splicing cycle-related genes and cell cycle related genes are significantly up-regulated and S-phase DNA replication and DNA repair-related genes and cell cycle related genes are significantly up-regulated and
Task Progress: New project for FY2019.	Rationale for HRP Directed Research	1:
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Bibliography Type: Description: (Last Updated: 06/26/2025)	Task Progress:	New project for FY2019.
	Bibliography Type:	Description: (Last Updated: 06/26/2025)