Fiscal Year:	FY 2021	**Task Last Updated:**	FY 08/30/2021
PI Name:	Jahng, James Won Suk Ph.D.		
Project Title:	Countermeasure Development Against Myocardial Mitochondrial Stress by Space Radiation Exposure		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	TRISH--TRISH		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	None		
Human Research Program Risks:	None		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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City:	Stanford	**State:**	CA
Zip Code:	94305	**Congressional District:**	18
Comments:			
Project Type:	Ground	**Solicitation / Funding Source:**	2021 TRISH-RFA-2101-PD: Translational Research Institute for Space Health (TRISH) Postdoctoral Fellowships
Start Date:	09/01/2021	**End Date:**	08/31/2022
No. of Post Docs:	1	**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:**	TRISH
Contact Monitor:		**Contact Phone:**	
Contact Email:			
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Wu, Joseph M.D., Ph.D. (MENTOR: Stanford University)		
Grant/Contract No.:	NNX16AO69A-P0604		
Performance Goal No.:			
Performance Goal Text:			
	POSTDOCTORAL FELLOWSHIP Astronauts on long space missions are exposed to prolonged space radiation exposure which contains highly penetrable ionizing radiation and can cause serious cardiovascular complications. There are many uncertainties in assessing the biological effects of chronic space radiation exposure because space radiation is very distinct from terrestrial radiation such as X-rays or gamma rays. This is especially true when one is exposed to radiation at low dose. Currently, there are no effective countermeasures to prevent or treat space radiation induced health complications. The objective of this postdoctoral fellowship proposal is to develop novel and effective countermeasure against space radiation induced cardiovascular injury using induced pluripotent stem cells (iPSC). The invention of iPSCs has		

Task Description:	provided us an accessible, versatile, and adaptable source of stem cells which can be differentiated into any cell types we desire. I will generate cardiomyocytes from iPSCs and screen large number of chemical compounds for radioprotective drugs that preserve the contractility in iPSC cardiomyocytes under mitochondrial stress. Emerging evidence suggests that spaceflight environment causes mitochondrial dysfunction and mitochondrial stress response pathways that contribute to degenerative effects by radiation exposure. Once I identify candidate drugs, I will test them in heart-like organs which are engineered by mixing iPSC-derived cardiomyocytes, endothelial cells, and cardiac fibroblasts. In addition, 3D iPSC-derived engineered heart tissues will undergo chronic space radiation at low dose, and I will comprehensively characterize the functional and molecular changes occurring in engineered heart tissues after irradiation. I will use X-rays as a terrestrial control. Successful completion of this postdoctoral fellowship study will provide (i) study results of chronic space radiation exposure on human hearts and (ii) development of novel radioprotective countermeasure against space radiation-induced injuries. Reducing uncertainties in cardiovascular risks against space radiation will accelerate humanity's dream to travel space.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2021.
Bibliography Type:	Description: (Last Updated: 01/12/2023)