Fiscal Year:	FY 2015	**Task Last Updated:**	FY 11/21/2014
PI Name:	Patel, Zarana Ph.D.		
Project Title:	Development of a Flow-Perfused and Immunocompetent 3-D Vascular Model for Radiation Risk Assessment of Cardiovascular Disease and Countermeasure Screening		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:			
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **SR**:Space Radiation		
Human Research Program Risks:	(1) **Cardiovascular**:Risk of Cardiovascular Adaptations Contributing to Adverse Mission Performance and Health Outcomes		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	zarana.s.patel@nasa.gov	**Fax:**	FY
PI Organization Type:	NASA CENTER	**Phone:**	281-483-3723
Organization Name:	KBRwyle/NASA Johnson Space Center		
PI Address 1:	Science, Technology and Engineering Group		
PI Address 2:	2400 NASA Parkway		
PI Web Page:			
City:	Houston	**State:**	TX
Zip Code:	77058	**Congressional District:**	22
Comments:	NOTE: PI moved to Wyle in 2014; previously at Universities Space Research Association.		
Project Type:	GROUND	**Solicitation / Funding Source:**	2013 HERO NNJ13ZSA002N-Crew Health OMNIBUS
Start Date:	03/01/2015	**End Date:**	09/01/2016
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
Contact Monitor:	Simonsen, Lisa	**Contact Phone:**	
Contact Email:	lisa.c.simonsen@nasa.gov		
Flight Program:			
Flight Assignment:	NOTE: Extended to 9/1/2016 per S. Monk/SR HRP (Ed., 3/14/16) NOTE: change in period of performance per PI (originally 10/1/2014-9/30/2015)--Ed., 7/11/15		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Grande-Allen, Kathryn Ph.D. (Rice University)		
Grant/Contract No.:	Internal Project		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Exposure to the types of radiation encountered in space is known to result in degenerative effects on vascular tissue, including the development of atherosclerosis. In this pathology, monocytes and macrophages play a key role in initiating events and lesion formation in response to radiation injury; they are a prime source of reactive oxygen species and a milieu of pro-inflammatory mediators and growth factors that mediate disease progression. To date, there has been very limited use of in vitro coculture systems that include immune cells in cell culture experiments for space radiation risk assessment of degenerative cardiovascular diseases. We propose an innovative approach to address the Degen-1 knowledge gap with the development of cocultures of human endothelial cells, smooth muscle cells, and macrophages, providing an immunocompetent 3-D vascular model grown under shear flow conditions for ground-based research. This model will allow for the quantitative assessment of the degenerative risk of space radiation exposure on atherosclerosis, and allow for countermeasure screening without the use of animals. We will also adapt the system to a spheroid format that will make it readily available for use in rotating wall vessel bioreactors for microgravity studies and future flight definition investigations. Development of this model will partially close the Degen-1 gap by providing a realistic, 3-D cell culture model for mechanistic research on the development of vascular diseases caused by space radiation exposure.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2015.
Bibliography Type:	Description: (Last Updated: 08/25/2020)