Fiscal Year:	FY 2013	**Task Last Updated:**	FY 07/24/2012
PI Name:	Natarajan, Mohan Ph.D.		
Project Title:	Targeting NO/IKK Signaling to Counteract Hemodynamic Flow-Dependent Endothelial Dysfunction and Vascular Damage after Space Radiation		
Division Name:	Human Research		
Program/Discipline:	NSBRI		
Program/Discipline--Element/Subdiscipline:	NSBRI--Cardiovascular Alterations Team		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **HHC**:Human Health Countermeasures		
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		
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Zip Code:	78229-3901	**Congressional District:**	21
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2011 Crew Health NNJ11ZSA002NA
Start Date:	11/01/2012	**End Date:**	10/31/2015
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:**	NSBRI
Contact Monitor:		**Contact Phone:**	
Contact Email:			
Flight Program:			
Flight Assignment:	NOTE: Period of performance change per NSBRI; previous POP was 9/1/2012-8/31/2015 (Ed., 11/13/12)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Blakely, Eleanor (Lawrence Berkeley National Laboratory) Mohan, Sumathy (University of Texas, San Antonio) Prihoda, Tom (University of Texas, San Antonio)		
Grant/Contract No.:	NCC 9-58-CA02802		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	The development of subclinical vascular abnormalities, which have been known to occur during space mission, is largely due to functional alterations of endothelial cells (inner lining of the vessels). Endothelial dysfunction is regarded as a primary sub-clinical condition that could progress into cardiovascular diseases over the life of the astronauts. Our hypothesis is that space radiation at low doses may impair the interplay between three key proteins (eNOS, Hsp-90 and IKK-#) and cause functional alterations of endothelial cells. This dysfunctional endothelium fails to regulate vascular healing processes and negates cell migration/motility. When unchecked, this may predispose the vascular bed to become a sustained pro-inflammatory milieu for the initiation of cardiovascular abnormalities. Radiation exposure can simultaneously also have an impact on endothelial progenitor cells (EPCs) and thereby attenuate EPC-dependent repair and reendothelializqation. The objectives are: (i) to investigate the significance of high LET radiation on causing endothelial dysfunction and associated damages on vascular bed, impairment of cell migration/motility and inhibition of vascular healing processes. Three different HZE ion beams (16O, 28Si, and 56Fe) accelerated to the same velocity (600 MeV/amu) and having similar track structure dimensions, but different ionization densities will be compared; (ii) to study how high LET radiation concurrently exploits eNOS, Hsp-90, and IKK# signaling to cause endothelial dysfunction, while impairing the repair capacity of bone-marrow derived endothelial progenitor cells (EPCs); and (iii) to examine whether the findings, whilst allowing us to gain knowledge on the mechanism of cardiovascular alterations by high LET radiation exposure, would lead us to develop and quantitatively assess biological countermeasures for cardiovascular risks. This study emphasizes a multi-stage approach (in vitro, ex vivo and in vivo) to understand the underlying mechanism of functional alteration of flow-adapted endothelial cells in response to space radiation. This study fits-in very well with HRP-Integrated Research Program road map.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2012.
Bibliography Type:	Description: (Last Updated: 04/11/2021)