

<b>Fiscal Year:</b>	FY 2014	<b>Task Last Updated:</b>	FY 12/18/2014
<b>PI Name:</b>	Boerma, Marjan Ph.D.		
<b>Project Title:</b>	Center for Research on Cardiac, Vascular, and Acute Effects of Space Radiation		
<b>Division Name:</b>	Human Research		
<b>Program/Discipline:</b>			
<b>Program/Discipline--Element/Subdiscipline:</b>	NSBRI--Radiation Effects Team		
<b>Joint Agency Name:</b>	<b>TechPort:</b>	No	
<b>Human Research Program Elements:</b>	(1) <b>SR</b> :Space Radiation		
<b>Human Research Program Risks:</b>	(1) <b>ARS</b> :Risk of Acute Radiation Syndromes Due to Solar Particle Events (SPEs) (2) <b>Degen</b> :Risk Of Cardiovascular Disease and Other Degenerative Tissue Effects From Radiation Exposure (IRP Rev F)		
<b>Space Biology Element:</b>	None		
<b>Space Biology Cross-Element Discipline:</b>	None		
<b>Space Biology Special Category:</b>	None		
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<b>Zip Code:</b>	72205-7101	<b>Congressional District:</b>	2
<b>Comments:</b>			
<b>Project Type:</b>	GROUND	<b>Solicitation:</b>	2013 NSBRI-RFA-13-02 Center for Space Radiation Research (CSRR)
<b>Start Date:</b>	06/01/2014	<b>End Date:</b>	05/31/2017
<b>No. of Post Docs:</b>		<b>No. of PhD Degrees:</b>	
<b>No. of PhD Candidates:</b>		<b>No. of Master' Degrees:</b>	
<b>No. of Master's Candidates:</b>		<b>No. of Bachelor's Degrees:</b>	
<b>No. of Bachelor's Candidates:</b>		<b>Monitoring Center:</b>	NSBRI
<b>Contact Monitor:</b>		<b>Contact Phone:</b>	
<b>Contact Email:</b>			
<b>Flight Program:</b>			
<b>Flight Assignment:</b>			
<b>Key Personnel Changes/Previous PI:</b>			
<b>COI Name (Institution):</b>	Hauer-Jensen, Martin M.D., Ph.D. ( University of Arkansas ) Kodell, Ralph Ph.D. ( University of Arkansas ) Koturbash, Igor M.D., Ph.D. ( University of Arkansas ) Mao, Xiao Wen M.D. ( Loma Linda University ) Nelson, Gregory Ph.D. ( Loma Linda University ) Tackett, Alan Ph.D. ( University of Arkansas )		
<b>Grant/Contract No.:</b>	NCC 9-58-RE03701		
<b>Performance Goal No.:</b>			
<b>Performance Goal Text:</b>			

<b>Task Description:</b>	Recent evidence strongly suggests that humans will face increased risks for adverse effects on heart and blood vessels from radiation exposure during space travel; however, these risks are not well defined. The proposed Center for Research on Cardiac and Vascular Effects of Space Radiation comprises teams from four institutions with experts in the fields of space radiation, cardiovascular radiation injury, and modern techniques of molecular analysis. The goal is to characterize the cardiovascular risks of space radiation. Studies will begin with mouse models and then proceed to rabbits to enhance translation to the human situation. Animals will be exposed to accelerated charged particles relevant to radiation in interplanetary space, and monitored for up to 9 months comparable to many years observation in humans. Heart function will be measured non-invasively at regular intervals with high-resolution ultrasound. Heart tissue will be obtained at different time points to investigate pathological changes, including scar tissue and inflammation. Cutting-edge molecular techniques will be used to examine thousands of proteins and DNA segments to understand mechanisms of radiation injury and aid in the discovery of sensitive biomarkers. We will also examine blood vessels in the heart and the retina of the eye, based on evidence that space radiation causes changes in the retinal blood vessel network, similar to those associated with reduced vision due to aging. Sensitive staining techniques will be used to reconstruct the structure of blood vessels in the retina and heart. Lastly, we will test whether gamma-tocotrienol, a safe dietary antioxidant and the strongest natural product radiation protector yet discovered, will reduce the effects of space radiation on heart and blood vessels. Altogether, these studies use innovative methods to characterize acute and degenerative cardiovascular effects of space radiation, and will help develop safe and effective countermeasures to protect humans against these effects.
<b>Rationale for HRP Directed Research:</b>	
<b>Research Impact/Earth Benefits:</b>	0
<b>Task Progress:</b>	New project for FY2014.
<b>Bibliography Type:</b>	Description: (Last Updated: 09/19/2019)