

Fiscal Year:	FY 2013	Task Last Updated: FY 07/12/2013	
PI Name:	Levine, Benjamin D M.D.		
Project Title:	Cardiovascular Imaging and Strategies to Mitigate the Risk for Cardiac Events in Astronauts During Prolonged Spaceflight		
Division Name:	Human Research		
Program/Discipline:	NSBRI		
Program/Discipline--Element/Subdiscipline:	NSBRI--Cardiovascular Alterations Team		
Joint Agency Name:		TechPort:	Yes
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 (2) Medical Conditions: Risk of Adverse Health Outcomes and Decrements in Performance Due to Medical Conditions that occur in Mission, as well as Long Term Health Outcomes Due to Mission Exposures		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	75231-5129	Congressional District:	5
Comments:			
Project Type:	GROUND	Solicitation / Funding Source:	2009 Crew Health NNJ09ZSA002N
Start Date:	06/01/2010	End Date:	05/31/2014
No. of Post Docs:	3	No. of PhD Degrees:	0
No. of PhD Candidates:	0	No. of Master' Degrees:	0
No. of Master's Candidates:	0	No. of Bachelor's Degrees:	0
No. of Bachelor's Candidates:	1	Monitoring Center:	NSBRI
Contact Monitor:	Contact Phone:		
Contact Email:			
Flight Program:			
Flight Assignment:	NOTE: Risk/Gap changes per IRP Rev E (Ed., 3/19/14)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Radford, Nina (Cooper Institute) Khera, Amit (The University of Texas Southwestern Medical Center at Dallas)		
Grant/Contract No.:	NCC 9-58-CA02201		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	<p>This project from the Cardiovascular Alterations Team will enhance current NASA cardiovascular disease risk reduction strategies by partnering with investigators for the Aerobics Center Longitudinal Study (ACLS) and the Dallas Heart Study (DHS) to determine how to minimize the risk of a catastrophic cardiovascular event in asymptomatic astronauts. During an exploration class space mission, such as a mission to Mars, astronauts will not have access to comprehensive health care services for periods of 2 years, and possibly longer. Since the majority of experienced astronauts are middle aged (average age 46, range 33-58 years), they are at risk for developing serious cardiovascular events which are life-threatening for the astronaut, and mission threatening for NASA. The ability to identify 'at risk' individuals who are currently asymptomatic is a topic of intense research within the cardiovascular community that is relevant both for NASA and public health. The primary objective of this application is to determine the risk of coronary events associated with changes in coronary artery calcium (CAC) scores over time, and to determine whether this risk can be mitigated by increases in physical fitness, or use of lipid lowering therapy.</p> <p>Hypothesis 1: A change in coronary calcium score over time from <10 to >10, is associated with an increase in risk for coronary events; this risk is most prominent when the CAC score increases above a threshold level of 100. Hypothesis 2: The increased risk associated with increasing CAC scores is mitigated by increasing levels of physical fitness and/or the use of lipid lowering therapy (statins). To test these hypotheses, we will accomplish the following specific aims:</p> <p>Specific Aim 1: To identify ALL clinical events in the ACLS data base. We will identify and verify all myocardial infarctions, new onset angina, and revascularization procedures in ACLS patients who fit the astronaut demographics and who have had more than one CAC measurement. Specific Aim 2: To update the ACLS data base to include information about timing and dose of statin medications. This information will be linked with treadmill time and the clinical events from aim 1 to developed robust risk prediction models. After completion of these specific aims we will acquire information that is essential to inform decisions regarding astronaut selection for space exploration and will allow the flight surgeons to minimize the risk for catastrophic cardiovascular events. The project will have wide spread implications for public health and cardiovascular risk reduction in the population at large, especially for the asymptomatic individual.</p>
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	<p>After completion of these specific aims, we will have determined the short term risk of cardiovascular events associated with changes in CAC scores, and its mitigation by fitness and/or medications. This information will inform decisions regarding astronaut selection for exploration class missions and will minimize the risk for catastrophic cardiovascular complications during spaceflight, yet at the same time, ensure that the most experienced and healthy crew are available to fly. The project will also have implications for public health and will clarify the meaning of changes in CAC scores, and produce strategies to reduce the risk for cardiovascular events in the population at large.</p>
Task Progress:	<p>We have completed all event verifications for the entire ACLS data base. THIS ACCOMPLISHMENT REPRESENTS THE KEY PROGRESS REQUIRED TO ACCOMPLISH OUR OBJECTIVES. We have just begun the analysis of the relationship between coronary calcium scores and events, and should have the final data analysis completed by the fall, allowing at least 6 months for paper writing.</p>
Bibliography Type:	Description: (Last Updated: 12/13/2023)