

<b>Fiscal Year:</b>	FY 2009	<b>Task Last Updated:</b>	FY 07/31/2009
<b>PI Name:</b>	Amin, Shreyasee M.D.		
<b>Project Title:</b>	Epidemiologic Analyses of Risk Factors for Bone Loss and Recovery Related to Long Duration Space Flight		
<b>Division Name:</b>	Human Research		
<b>Program/Discipline:</b>	HUMAN RESEARCH		
<b>Program/Discipline-- Element/Subdiscipline:</b>			
<b>Joint Agency Name:</b>		<b>TechPort:</b>	No
<b>Human Research Program Elements:</b>	(1) <b>HHC:</b> Human Health Countermeasures		
<b>Human Research Program Risks:</b>	(1) <b>Bone Fracture:</b> Risk of Bone Fracture due to Spaceflight-induced Changes to Bone (2) <b>Osteo:</b> Risk Of Early Onset Osteoporosis Due To Spaceflight		
<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>	55905	<b>Congressional District:</b>	1
<b>Comments:</b>			
<b>Project Type:</b>	Ground	<b>Solicitation / Funding Source:</b>	2007 Crew Health NNJ07ZSA002N
<b>Start Date:</b>	08/01/2008	<b>End Date:</b>	07/31/2011
<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> NASA JSC		
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<b>Flight Program:</b>			
<b>Flight Assignment:</b>	NOTE: Period of performance changed to 8/1/2008-7/31/2011 (from 5/20/08-5/19/11) per C. Guidry/JSC (3/2010)		
<b>Key Personnel Changes/Previous PI:</b>	The Ph D statistician on this project at JSC was changed from Dr. Matthew Hayat, who left USRA, to Dr. Robert Ploutz-Snyder, who is his replacement at USRA.		
<b>COI Name (Institution):</b>	Khosla, Sundeep ( Mayo Clinic ) Sibonga, Jean ( USRA )		
<b>Grant/Contract No.:</b>	NNX08AQ20G		
<b>Performance Goal No.:</b>			
<b>Performance Goal Text:</b>			

Task Description:	<p>Bone loss is estimated to occur at a rate of 1% per month in space (microgravity), particularly in weight-bearing bones in the legs and spine. This rate of loss is equivalent to what we might lose in a year with advancing age on Earth. It remains unknown what this loss signifies for future fracture risk in crewmembers. While unloading of the skeleton in the weightless environment of space is considered the key factor contributing to bone loss, there are likely other factors that also play a role. Current prevention strategies have not been effective at preventing this bone loss. Improved understanding on the risk for fracture following long-duration space flight, as well as the factors contributing to bone loss in microgravity, and its recovery, are needed in order to develop better prevention strategies for the benefit of crew health, both during and after long-duration space exploration, and mission success. The proposed research will take advantage of an established population-based cohort, which includes men and women of an age range similar to crewmembers in the US space program, who have had bone density measured over time. We will make comparisons between bone densities of crewmembers and the population-based data and use fracture prediction models derived from the cohort to make estimations on fracture risk among crewmembers. We will also explore the data already gathered to date during the US human space program in order to summarize the current state of evidence available on additional risk factors related to bone loss and recovery in microgravity. The ultimate goal of this research proposal is to provide evidence-based information which may assist in guiding the direction of further research required to better understand the risk of bone loss and fracture among crewmembers and the strategies that could be developed to prevent it from occurring.</p>
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	<p>I. SPECIFIC AIMS:</p> <p>AIM 1: To investigate the risk of microgravity exposure on long-term changes in bone health and fracture risk.</p> <p>AIM 2: To provide a summary of the current evidence available on potential risk factors for bone loss, recovery and fracture following long-duration space exploration.</p> <p>II. SUMMARY OF WORK TO DATE RELATED TO AIMS:</p> <p>During this first year of funding we have been assembling the data required for the proposed analyses. Work at both Mayo Clinic and Johnson Space Center-NASA (JSC-NASA) is ongoing to complete the goals of these aims.</p> <p>At Mayo Clinic, we have updated the fracture incidence data from our population-based cohort of men and women from the Rochester Bone Health Study. This data will be used for the fracture prediction models in Aim 1. Fracture incidence is now complete for our cohort through to the end of 2008.</p> <p>At JSC-NASA, work is ongoing to assemble data and coordinate the logistics for analyses to be performed by Mayo Clinic statisticians. We have achieved 100% participation from eligible long-duration crew members, have assembled some of the key data for analyses and have made major strides in achieving secure remote access to the JSC-NASA servers, which the Mayo Clinic investigators need in order to begin analyses of the data.</p> <p>Our progress during the first year has been slower than anticipated. As investigators outside NASA requesting access to previously collected archived clinical data from crew members, we are working through many uncharted issues related to our access of the data for our analyses. Most have been overcome, but the logistics of obtaining security clearance and remote access for Mayo Clinic investigators were complex and lengthy. As of the end of May 2009, the final steps in obtaining remote access to the secure servers at JSC-NASA were still being finalized and data analyses are expected to start by the summer of 2009.</p> <p>Our initial timeline was to complete Aim 1 over the first 1.5 years of funding. Although our progress has been slower than anticipated, given the unprecedented nature of this work and some of our unique requirements, we have, in fact, made considerable progress towards the goals of this proposal. There will be undoubtedly additional logistic or uncharted issues to address surrounding our analyses as we proceed, but we will continue to work with our collaborators at JSC-NASA towards completing most of the sub-aims in Aim 1 by the middle of the second year of funding. We have been fortunate to be working with a committed team of collaborators at JSC-NASA who have been a considerable asset in assisting us with this work. Our goal is to start Aim 2 towards the latter half of the second year of funding.</p>
Bibliography Type:	Description: (Last Updated: 07/01/2019)