Fiscal Year:	FY 2008	**Task Last Updated:**	FY 05/30/2008
PI Name:	Bloomfield, Susan A. Ph.D.		
Project Title:	Maintaining Musculoskeletal Health in the Lunar Environment		
Division Name:	Human Research		
Program/Discipline:	NSBRI		
Program/Discipline--Element/Subdiscipline:	NSBRI--Musculoskeletal Alterations Team		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **HHC**:Human Health Countermeasures		
Human Research Program Risks:	(1) **Bone Fracture**:Risk of Bone Fracture due to Spaceflight-induced Changes to Bone (2) **Osteo**:Risk Of Early Onset Osteoporosis Due To Spaceflight		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	sbloom@tamu.edu	**Fax:**	FY 979-862-1692
PI Organization Type:	UNIVERSITY	**Phone:**	979-845-2871
Organization Name:	Texas A&M University		
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PI Web Page:			
City:	College Station	**State:**	TX
Zip Code:	77843-4375	**Congressional District:**	17
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2007 Crew Health NNJ07ZSA002N
Start Date:	06/01/2008	**End Date:**	05/31/2012
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:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Hogan, Harry (Texas A&M University) Fluckey, James (Texas A&M University) Braby, Leslie (Texas A&M University)		
Grant/Contract No.:	NCC 9-58-MA01602		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	The overarching purpose of this project is to determine if the usual bone and muscle loss observed during spaceflight will be mitigated by the moon's partial gravity, if radiation exposure exacerbates bone/muscle loss at this reduced loading level, and if exercise is effective in mitigating the loss under these conditions. This requires an effective model of the lunar environment that simulates conditions during lunar outpost missions. We will use a novel, partial-gravity mouse model to first determine the independent impact of the moons 1/6 gravity on multiple bone and muscle outcomes, including direct determinations of bone breaking strength and other mechanical properties as well as muscle function in the live animal. We will then test the additional impact of low-dose radiation modeling galactic cosmic radiation during partial gravity conditions by exposing these mice to one acute dose, or four, fractionated doses on a weekly basis, of ionizing radiation. Data from these experiments will be used to justify expanded experiments at the Brookhaven NASA Space Radiation Laboratory utilizing heavy iron ions to simulate galactic cosmic radiation. Finally, we will assess the impact of the lunar environment (partial gravity plus modeled space radiation) on the musculoskeletal response to exercise countermeasures. Using an animal model to pursue these objectives provides for these advantages: 1. Direct determinations of bone quality with mechanical testing of bone at the end of each experiment; 2. Discovering the effect of radiation on the response to partial gravity and to exercise countermeasures, which cannot be ethically tested in human subjects; and 3. More rapid turn-around and much reduced cost for experiments than those involving long-duration human bed-rest studies. These experiments will provide unique and valuable data about bone loss and impaired muscle function and determine efficacy of two different exercise countermeasures in a modeled lunar environment.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2008.
Bibliography Type:	Description: (Last Updated: 05/28/2021)