

Fiscal Year:	FY 2013	Task Last Updated:	FY 09/27/2013
PI Name:	Hogan, Harry Ph.D.		
Project Title:	Can Benefits from a Single Administration of Bisphosphonates Extend to a Second Later Exposure to Microgravity?		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Biomedical countermeasures		
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:	hhogan@tamu.edu	Fax:	FY
PI Organization Type:	UNIVERSITY	Phone:	979-845-1538
Organization Name:	Texas A&M University		
PI Address 1:	Dept. of Mechanical Engineering		
PI Address 2:	TAMU 3123		
PI Web Page:			
City:	College Station	State:	TX
Zip Code:	77843-3123	Congressional District:	17
Comments:			
Project Type:	GROUND	Solicitation / Funding Source:	2012 Crew Health NNJ12ZSA002N
Start Date:	09/30/2013	End Date:	09/30/2014
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: NASA ARC		
Contact Monitor:	Ronca, April Elizabeth	Contact Phone:	650.400.6019
Contact Email:	april.e.ronca-1@nasa.gov		
Flight Program:			
Flight Assignment:	NOTE: Start date changed to 9/30/2013 per discussions with A. Chu/ARC (Ed., 7/9/14)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Bloomfield, Susan Ph.D. (Texas A&M University)		
Grant/Contract No.:	NNX13AQ87G		
Performance Goal No.:			
Performance Goal Text:	Two recent trends in ISS crew member patterns is that more are making repeat flights into space and some have begun using osteoporosis drugs as a countermeasure to the negative effects of microgravity on the skeletal system. This pilot project aims to provide new data that can help better understand the effects of multiple missions on those crew members who have taken such osteoporosis drugs as part of a previous mission, or who might be considering this in the future. Initial results have shown impressive benefits. Selected crew members have taken alendronate, which is a popular osteoporosis drug from the class known as bisphosphonates, just before and during their ISS missions and have reported much milder effects on bone density. Based on the mechanisms of action for this class of drugs, it is plausible, and perhaps even likely, that the benefits gained from taking alendronate for one mission could actually extend into a second mission without further treatment at all. The goal of the proposed research is to address this question directly		

Task Description:	using the well-established, ground-based analog: the adult hindlimb unloaded (HU) rat model. We have conducted an extensive set of experiments for NASA in recent years using this model to examine multiple exposures to microgravity but none of these included the osteoporosis drugs. In the current project, we will determine the effects of a single administration of bisphosphonates on adult male rats exposed to two successive HU exposures, with a period of recovery between the two. The focus will be to compare the effects of the second HU on the group of animals that has been administered alendronate concurrently with the first HU exposure with those that have not. We will quantify bone mineral content, bone mineral density, and various measures of cross-sectional geometry and shape using pQCT scans made every 28 days on anesthetized living animals. We will also measure bone strength and histological parameters on tissue specimens harvested at the end of the study. Completion of the studies outlined in this proposal will provide critical new findings quantifying the possible persistent beneficial effects of a single bisphosphonate treatment on a second later exposure to microgravity. These findings are strongly relevant to care and planning for current ISS crewmembers. The key deliverable in this regard will be the knowledge gained and the promising prospects for translating this directly to assessment of current and future ISS crew member missions.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2013.
Bibliography Type:	Description: (Last Updated: 01/11/2021)