Task Book Report Generated on: 09/20/2024

Fixed   Year's   PY 2006				
Project Title:	Fiscal Year:		Task Last Updated:	FY 01/08/2007
Program/Discipline:   NSBRI Teams   STRAIT Teams   Program/Discipline:   NSBRI Teams   STRAIT		Schaffler, Mitchell B. Ph.D.		
Program/Discipline:         NSBRI Teams—Bone Loss Team           Program/Discipline:         NSBRI Teams—Bone Loss Team           Joint Agency Name:         Tech Port:         No           Iluman Research Program Elements         (1) IIIC-Human Health Countermeasures           Iluman Research Program Elements         (1) Bine Fracture Risk of Flome Fracture due to Spaceflight-induced Changes to Bone: Counter Coun	Project Title:	Bone Recovery Potential After Bisphosphonate and PTI	H Treatment of Disuse Osteopor	rosis
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Element/Sudriscipline:  Joint Agency Name:  Joint Agency Name:  (I) HMC-Human Health Countermeasures  Human Research Program Elements:  (I) Hone Fracture-Risk of Bone Fracture due to Spaceflight-induced Changes to Bone  Space Biology Element:  None  None  Space Biology Cross-Element:  None  Space Biology Cross-Element:  None  Space Biology Cross-Element:  None  Space Biology Special Category:  None  Pl Email:  Pl Memail:  Mitchell Schaffler@mesmedu  Pl Email:  Mount Sinai School of Medicine  Pl Address 1:  One Gustave L Levy Place  Pl Address 1:  One Gustave L Levy Place  Pl Address 2:  New York  Journell Web Page:  Clip:  Agent Mount Sinai School of Medicine  Pl Web Page:  Clip:  New York  Journell Web Page:  Clip:  Agent Mount Sinai School of Medicine  Pl Web Page:  Clip:  Agent Mount Sinai School of Medicine  Pl Web Page:  Clip:  Agent Mount Sinai School of Medicine  Pl Web Page:  Clip:  Agent Mount Sinai School of Medicine  Pl Web Page:  Clip:  Agent Mount Sinai School of Medicine  Pl Web Page:  Clip:  Agent Mount Sinai School of Medicine  Pl Web Page:  Clip:  Agent Mount Sinai School of Medicine  Pl Web Page:  Clip:  Agent Mount Sinai School of Medicine  Pl Web Page:  Clip:  Agent Mount Sinai School of Medicine  Pl Web Page:  Clip:  Agent Mount Sinai School of Medicine  Pl Web Page:  Clip:  Agent Mount Sinai School of Medicine  New York  Agent Mount Sinai School of Medicine  Agent Mount Sinai School of Medicine  Agent Mount Sinai School of Medicine  No. of Mascret Degrees:  Agent Mount Sinai School of Medicine  Clip:	Program/Discipline:	NSBRI Teams		
Human Research Program Elements (1) HHC-Human Health Countermeasures    Counter   Coun		NSBRI TeamsBone Loss Team		
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Space Biology Element:   None   None   None   Space Biology Cross-Element   None   Space Biology Cross-Element   None   Space Biology Cross-Element   None   Space Biology Special Category:   Phone: 212-241-1625	<b>Human Research Program Elements:</b>	(1) HHC:Human Health Countermeasures		
Space Biology Cross-Element Discipline:         None           Space Biology Special Category:         None           P1 Email:         Mitchell Schaffler@msm.edu         Fax:         FY 212-426-7750           P1 Organization Type:         UNIVERSITY         Phone:         212-241-1625           Organization Name:         Mount Sinai School of Medicine         Plant         Plant         212-241-1625           P1 Address 1:         One Gustave L. Levy Place         Plant         Plant <td>Human Research Program Risks:</td> <td></td> <td></td> <td></td>	Human Research Program Risks:			
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Pl Email:   Mitchell Schaffler@mssm.edu   Fax: FY 212-426-7750     Pl Organization Type:   UNIVERSITY   Phone: 212-241-1625     Organization Name:   Mount Sinai School of Medicine     Pl Address 1:   One Gustave L. Levy Place     Pl Address 2:   Box 1188     Pl Web Page:		None		
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No. of Bachelor's Candidates:  Contact Monitor:  Contact Email:  Flight Program:  Flight Assignment:  Key Personnel Changes/Previous PI:  COI Name (Institution):  Jepsen, Karl (Mount Sinai School of Medicine)  Majeska, Robert (Mount Sinai School of Medicine)  Grant/Contract No.:  NCC 9-58-BL00406  Performance Goal No.:	No. of PhD Candidates:	1	No. of Master' Degrees:	0
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Task Description:	Bone loss in microgravity and the resulting bone fragility have been identified by NASA as key barriers to successful long-term space flight. Effective countermeasures must therefore prevent bone loss, but also to maintain the mechanical integrity of the tissue during prolonged space flight and allow rapid recovery of normal function. Disuse osteoporosis in humans and higher mammals results from elevated bone resorption. Thus, targeting osteoclasts with antiresorptive agents like bisphosphonate to prevent bone loss is a key strategy. While anti-resorptive drugs have been the cornerstones of osteoporosis therapy, anabolic agents, such as PTH, that stimulate bone formation represent an important new advance in the treatment of osteoporosis. We hypothesize that PTH may be especially valuable in reversing disuse if the deterioration of bone architecture can be slowed such that the anabolic agent has a better initial bone scaffold on which to work.  The studies examine whether bone that remains after bisphosphonate-treatment during long-term immobilization can recover its architecture and mechanical function after restoration of mechanical usage (remobilization). We will then assess whether addition of anabolic PTH during immobilization will improve recovery of disuse bone. Recovery after long-term disuse with bisphosphonate treatment will be examined in an immobilization model. MicroCT imaging will be used to evaluate microstructure, biomechanical testing to assess function and histomorphometry to measure tissue physiological responses.	
Rationale for HRP Directed Research	:	
Research Impact/Earth Benefits:	The current research applies directly to prevention and treatment of osteoporosis on Earth. In particular, these studies will examine 1) the efficacy of antiresorptive therapy in slowing the bone loss that occurs with decreased of mechanical loading, and 2) the role of the bone anabolic agent, PTH, in accelerating bone recovery and restoring bone strength. This research uses pharmacological agents that are already approved for clinical use; thus the findings from this research can be expected to see rapid implementation in bone loss situations occurring as a result of unloading, such as spinal cord injury and long-term immobilization.	
Task Progress:	Long-term in vivo studies (Immobilization with and without, followed by restored weight bearing with and without anabolic PTH treatment, total duration 18 month durations) are ongoing and will be completed in late fall, 2006. Analyses of bone architecture, histomorphometry and biomechanics will begin thereafter. Our studies a structurally-based ultrasound for the prediction of mechanical properties bone are ongoing. Studies on the bone tissues from the current resorption suppression/remobilization + PTH experiments will be performed as these tissues become available.	
Bibliography Type:	Description: (Last Updated: 08/21/2020)	
Articles in Peer-reviewed Journals	Li, CY., C. Price, D. A. Laudier, R. J Majeska and M. B. Schaffler "Risedronate treatment only partially preserves cancellous bone mass and microarchitecture after long-term disuse" Jan-2006	
Articles in Peer-reviewed Journals	McNamara LM, Prendergast PJ, Schaffler MB. "Bone tissue material properties are altered during osteoporosis." J Musculoskelet Neuronal Interact. 2005 Oct-Dec;5(4):342-3. <a href="mailto:pMID:16340130">PMID: 16340130</a> , Oct-2005	
Articles in Peer-reviewed Journals	Wang L, Wang Y, Han Y, Henderson SC, Majeska RJ, Weinbaum S, Schaffler MB. "In situ measurement of solute transport in the bone lacunar-canalicular system." Proc Natl Acad Sci U S A. 2005 Aug 16;102(33):11911-6. <a href="PMID: 16087872">PMID: 16087872</a> , Aug-2005	