

Fiscal Year:	FY 2010	Task Last Updated:	FY 08/20/2010
PI Name:	Urban, Randall M.D.		
Project Title:	Testosterone Supplementation as a Countermeasure against Musculoskeletal Losses during Space Exploration		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Biomedical countermeasures		
Joint Agency Name:	TechPort:	Yes	
Human Research Program Elements:	(1) HHC: Human Health Countermeasures		
Human Research Program Risks:	(1) Muscle: Risk of Impaired Performance Due to Reduced Muscle Size, Strength and Endurance		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	77555-0569	Congressional District:	14
Comments:			
Project Type:	Ground	Solicitation / Funding Source:	2009 Crew Health NNJ09ZSA002N
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No. of PhD Candidates:		No. of Master' Degrees:	
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No. of Bachelor's Candidates:		Monitoring Center:	NASA JSC
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Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
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Task Description:	<p>The long-term goal of this proposal is to determine the therapeutic efficacy of testosterone and leucine at preserving lean muscle mass, muscle strength, and bone mineral density in healthy humans during spaceflight. We propose to examine the interactive or additive effects of the combination of testosterone or leucine and exercise on lean body mass (LBM), muscle strength and bone health. Our general hypothesis is that the maintenance of normal physiologic levels of testosterone in males or increasing leucine availability in females during spaceflight will protect against the functional loss of muscle and bone, and will maximize the efficacy of existing resistance exercise protocols at preventing or reversing functional impairments that occur during 3 months of bed rest in both men and women.</p> <p>To achieve these goals we will test the following specific hypotheses before, during and after 90 days of bed rest:</p> <p>1) Monthly cycled testosterone replacement (daily testosterone for 1st month, followed by one month off, etc.) in conjunction with exercise will have an additive effect in preventing loss of muscle mass, muscle strength, bone mass, and markers of bone metabolism in men representative of the astronaut population compared to exercise with placebo testosterone.</p> <p>2) Daily leucine supplementation (3 x 4g taken with meals) in conjunction with exercise will have an additive effect in preventing loss of muscle mass and muscle strength in women representative of the astronaut population compared to exercise with placebo leucine.</p> <p>To address these hypotheses we will investigate the following specific aims before, during and after 90 days of bed rest:</p> <p>Specific Aim 1A: To determine the effect of monthly cycled testosterone replacement in conjunction with resistance exercise on muscle mass, muscle strength, bone mass and markers of bone metabolism in men aged 35-55.</p> <p>Specific Aim 2B: To determine the effect of daily leucine supplementation in conjunction with resistance exercise on muscle mass and muscle strength, bone mass, and markers of bone metabolism in women aged 35-55.</p> <p>Current evidence suggests that the combination of testosterone, amino acids, and exercise will optimize the effectiveness of the existing exercise and nutritional countermeasures. Results from this proposal will lay the ground work for the implementation of combinational countermeasures that will additively work to maintain preflight physiology of female and male astronauts during long-term spaceflight missions.</p>
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2010.
Bibliography Type:	Description: (Last Updated: 01/11/2021)