Fiscal Year:	FY 2013	Task Last Updated:	FY 10/23/2012
PI Name:	Levine, Benjamin D M.D.		
Project Title:	Effects of Microgravity on Intracranial Pressure		
Division Name:	Human Research		
Program/Discipline:	NSBRI		
Program/Discipline Element/Subdiscipline:	NSBRICardiovascular Alterations Team		
Joint Agency Name:	Teo	chPort:	No
Human Research Program Elements:	(1) HHC :Human Health Countermeasures		
Human Research Program Risks:	(1) SANS: Risk of Spaceflight Associated Neuro-ocular Syndro	ome (SANS)	
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Comments:			
Project Type:	Ground	Solicitation / Funding Source:	2011 Crew Health NNJ11ZSA002NA
Start Date:	10/01/2012	End Date:	09/30/2015
No. of Post Docs:		No. of PhD Degrees:	
No. of PhD Candidates:	N	o. 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:			
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Key Personnel Changes/Previous PI:			
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Performance Goal No.:			
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Task Description:	Lately, some astronauts have experienced visual changes that could be due to increased pressure in the brain. However the mechanism(s) underlying this problem remain unknown. The current working model is that microgravity induced fluid shifts increase intracranial pressure (ICP) and may be exacerbated by increases in the partial pressure (CVP) was expected to increase in space but actually fell to zero in microgravity. Also, it is hard to conceive of how the ICP in space could be greater than that which is routinely experienced on the ground in the recumbent posture. Millions of patients and thousands of research volunteers have been confined to bed for prolonged periods of time, and to our knowledge, there has never been a case of bed-rest induced blindness. Unfortunately, despite the enthusiasm for methods to measure ICP non-invasively, none are robust or reliable, and none have been validated in normal individuals without intracranial pathology. The only way to obtain this knowledge with confidence is to make direct, invasive measurements of ICP during relevant changes in hydrostatic gradients. Moreover, concomitant evaluation of inflow (arterial) and outflow (venous) pressures and flows are essential to build the science base of the effect of gravitational gradients on intracranial hemodynamics. The primary objective of this application is to make the first direct, invasive measurements of ICP and cerebral hemodynamics during changes in hydrostatic gradients induced by simulated (bedrest) and real (parabolic flight) microgravity. In order to accomplish these objectives, we propose to test the following hypotheses: Hypothesis 1: The transition from upright to supine posture increases intracranial and venous pressures that result in minimal changes in cerebral blood flow, oxygen delivery, and cerebral autoregulation. Additional gravitational loading and unloading by maneuvers result in small additional changes compared to the difference from standing to supine. Hypothesis 2: True microgravity induced by parab
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2013.
Bibliography Type:	Description: (Last Updated: 05/20/2025)