Fiscal Year:	FY 2013	**Task Last Updated:**	FY 08/14/2013
PI Name:	Stenger, Michael Ph.D.		
Project Title:	Efficacy of Jobst Compression Garments to Prevent Orthostatic Intolerance for up to Three Days following 14 Days of Bed Rest		
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:	None		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Organization Name:	NASA Johnson Space Center		
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Zip Code:	77058	**Congressional District:**	22
Comments:	NOTE Aug 2018: Previously with KBRwyle at Johnson Space Center		
Project Type:	GROUND	**Solicitation / Funding Source:**	Directed Research
Start Date:	10/01/2010	**End Date:**	10/31/2012
No. of Post Docs:	1	**No. of PhD Degrees:**	0
No. of PhD Candidates:	1	**No. of Master' Degrees:**	0
No. of Master's Candidates:	0	**No. of Bachelor's Degrees:**	0
No. of Bachelor's Candidates:	0	**Monitoring Center:**	NASA JSC
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Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):			
Grant/Contract No.:	Directed Research		
Performance Goal No.:			
Performance Goal Text:			
Task Description:	Aims: 1. To determine whether subjects wearing breast-high, graded compression garments become orthostatically intolerant after 14 days of head-down tilt bed rest (Groups 1 and 2). Measures of efficacy will be presyncope-free survival to 80° head-up tilt testing and responses in blood pressure, heart rate, stroke volume, and cardiac output. 2. To determine the time course of cardiovascular readaptation during the first three days of post-bed rest (BR) recovery after using compression garments for a short period of time on BR+0 (Group 1). The brief usage of high compression garments on BR+0 models the use of the anti-G suit (AGS) among Space Shuttle crewmembers. Readaptation will be measured by responses of blood pressure, heart rate, stroke volume, cardiac output, and		

	presyncope-free survival time to 15-minute head-up tilt tests on BR+1 and BR+3 as well as measures of plasma volume each day of recovery. 3. To determine the effect of wearing graded compression garments on the time course of cardiovascular readaptation during the first three days of post-bed rest recovery (Group 2). Readaptation will be measured by responses of blood pressure, heart rate, stroke volume, cardiac output, and presyncope-free survival time to 15-minute head-up tilt tests on BR+1 and BR+3 as well as measures of plasma volume each day of recovery.
Rationale for HRP Directed Research:	This research is directed because it contains highly constrained research, which requires focused and constrained data gathering and analysis that is more appropriately obtained through a non-competitive proposal.
Research Impact/Earth Benefits:	Findings from this study have the potential to impact treatment of patients who are hypotensive and/or suffer from episodes of orthostatic intolerance. Commercially-available knee-high and thigh-high compression garments, while easy to don and convenient to wear, have limited effectiveness as previously tested in our laboratory. The commercially-available breast-high garment, while an effective protection against orthostatic intolerance, can be difficult to don, uncomfortable, and/or inconvenient to remove to urinate or defecate. In contrast, the three-piece garment developed for this project provides the same amount of coverage as the commercially-available breast-high garment but provides greater levels of compression than the commercially-available breast-high garment, is an effective countermeasure to orthostatic intolerance, is easy to don and doff, and can be more easily adjusted for comfort. The improvements to the wear and comfort realized in the development of the three-piece garments should enhance compliance with long-term wearing of compression garments, reduce hypotensive episodes, and improve the lifestyle of patients with orthostatic intolerance. A cardiologist who treats these types of patients has complimented the investigator team on the design of the test garment, and the manufacturer of the modified garment has applied for a US patent.
Task Progress:	This project was completed with a total of 16 volunteers, 8 control subjects (Group 1), and 8 treatment subjects (Group 2). Data analysis was completed, and a manuscript has been submitted for consideration of publication in a peer-reviewed scientific journal. Results from this work indicate that wearing the abdomen-high compression garments during an 80-degree head-up tilt test (Groups 1 and 2) prevented the orthostatic intolerance that is normally present after BR. Thigh-high garments (Group 2) provided some protection after BR, and wearing these garments did not impair recovery as measured by a tilt test three days after bed rest. (Ed. note: updated report provided by PI August 2013.)
Bibliography Type:	Description: (Last Updated: 05/20/2022)
Abstracts for Journals and Proceedings	Stenger MB, Lee SMC, Ribeiro LC, Brown AK, Westby CM, Platts SH. "Alternative compression garments." 2012 NASA Human Research Program Investigators' Workshop, Houston, TX, February 14-16, 2012. 2012 NASA Human Research Program Investigators' Workshop, Houston, TX, February 14-16, 2012. , Feb-2012
Articles in Peer-reviewed Journals	Stenger MB, Lee SM, Ribeiro LC, Phillips TR, Ploutz-Snyder RJ, Willig MC, Westby CM, Platts SH. "Gradient compression garments protect against orthostatic intolerance during recovery from bed rest." European Journal of Applied Physiology. 2014 Mar;114(3):597-608. Epub 2013 Dec 14. http://dx.doi.org/10.1007/s00421-013-2787-4 ; PubMed PMID: 24337701 (originally reported as Submitted July 2013.) , Mar-2014