

Fiscal Year:	FY 2008	Task Last Updated:	FY 09/12/2013
PI Name:	Platts, Steven H. Ph.D.		
Project Title:	Evaluation of Compression Garments as Countermeasures to Orthostatic Intolerance		
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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Zip Code:	77058	Congressional District:	36
Comments:			
Project Type:	Ground	Solicitation / Funding Source:	Directed Research
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Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
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Grant/Contract No.:	Directed Research		
Performance Goal No.:			
Performance Goal Text:	Previous work in our laboratory demonstrated that the NASA Anti-Gravity Suit (AGS) and the Russian Kentavr compression garment were effective countermeasures to orthostatic intolerance in subjects whose plasma volume was reduced pharmacologically to a similar degree as experienced by astronauts. While these compression garments were effective in these conditions, two observations led to the evaluation of other compression garments/conditions. First, although the AGS and Kentavr appeared to be equally effective in the initial study, the level of compression provided by the two garments were very different. The Kentavr provided compression of ~30 mmHg but the AGS was inflated to a pressure of ~78 mmHg. Thus, one objective of this study was to determine whether the AGS could provide a similar level of protection as the Kentavr when the AGS was inflated to provide a similar level of compression (~26 mmHg). Second, astronauts have reported uncomfortable levels of abdominal compression while using the AGS, which may be		

Task Description:	<p>particularly problematic after completing the pre-landing fluid loading protocol. Therefore, the second objective of this study was to determine the efficacy of a thigh-high compression garment, which might be more effective than either the AGS or the Kentavr because it provided a gradient compression to promote venous return. Both the AGS and Kentavr apply approximately the same level of compression across the entire length of the garment, but a commercially-available garment provides the highest pressure at the ankle, and the pressure decreases up the leg to the top of the thigh. Both garments were evaluated in normal healthy subjects who were hypovolemic due to the infusion of furosemide (Lasix), as has been previously used in our laboratory.</p> <p>The specific aims of this study were:</p> <ol style="list-style-type: none"> 1. Evaluate the effectiveness of thigh-high compression garments to prevent orthostatic intolerance in hypovolemic subjects. 2. Evaluate the effectiveness of the Anti-Gravity Suit (AGS) at 1 “click” (0.5 psi) to prevent orthostatic intolerance in hypovolemic subjects. 3. Compare the effectiveness of the two garments which provide similar average levels of compression across their respective lengths but provide different levels of coverage (thigh-high vs. abdomen-high).
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	<p>Both the AGS and Kentavr apply approximately the same level of compression across the entire length of the garment, but a commercially-available garment provides the highest pressure at the ankle, and the pressure decreases up the leg to the top of the thigh. Both garments were evaluated in normal healthy subjects who were hypovolemic due to the infusion of furosemide (Lasix), as has been previously used in our laboratory.</p> <p>Wearing the AGS inflated to 0.5 psi reduced the rate of presyncope in hypovolemic subjects during a 30-min 80° head-up tilt test compared to wearing no compression garments, while the thigh-high compression garments did not. However, the incidence of presyncope while wearing the AGS inflated to 0.5 psi was higher than while wearing the AGS inflated to 1.5 psi (33% vs. 0%). Differences in the level of protection despite similar average levels of compression provided by the two garments suggest that differences in the amount of coverage of the two garments (thigh-high compression garments vs. abdomen-high AGS) tested in this study is a key factor in the design of orthostatic intolerance countermeasure garments. Later designs of the next-generation garment that were tested in astronauts and bed rest subjects included abdominal compression.</p> <p>[Ed. note 9/12/13: information from PI's Task Book Initial Entry Form, provided September 2013]</p>
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