

<b>Fiscal Year:</b>	FY 2011	<b>Task Last Updated:</b>	FY 10/12/2010
<b>PI Name:</b>	Rajulu, Sudhakar Ph.D.		
<b>Project Title:</b>	Spinal Elongation and Its Effects on Seated Height in a Microgravity Environment		
<b>Division Name:</b>	Human Research		
<b>Program/Discipline:</b>	HUMAN RESEARCH		
<b>Program/Discipline--Element/Subdiscipline:</b>	HUMAN RESEARCH--Space Human Factors Engineering		
<b>Joint Agency Name:</b>	<b>TechPort:</b>	No	
<b>Human Research Program Elements:</b>	(1) <b>SHFH</b> :Space Human Factors & Habitability (archival in 2017)		
<b>Human Research Program Risks:</b>	(1) <b>HSIA</b> :Risk of Adverse Outcomes Due to Inadequate Human Systems Integration Architecture		
<b>Space Biology Element:</b>	None		
<b>Space Biology Cross-Element Discipline:</b>	None		
<b>Space Biology Special Category:</b>	None		
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<b>Zip Code:</b>	77058	<b>Congressional District:</b>	22
<b>Comments:</b>			
<b>Project Type:</b>	FLIGHT	<b>Solicitation / Funding Source:</b>	Directed Research
<b>Start Date:</b>	12/11/2007	<b>End Date:</b>	10/01/2011
<b>No. of Post Docs:</b>	<b>No. of PhD Degrees:</b>		
<b>No. of PhD Candidates:</b>	<b>No. of Master' Degrees:</b>		
<b>No. of Master's Candidates:</b>	<b>No. of Bachelor's Degrees:</b>		
<b>No. of Bachelor's Candidates:</b>	<b>Monitoring Center:</b> NASA JSC		
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<b>Flight Program:</b>	Shuttle/ISS		
<b>Flight Assignment:</b>	ISS 20, ISS 21, ISS 22, ISS 23, ISS 24, ISS 25, ISS 26 STS-128, STS-129, STS-130, STS-132, STS-133, STS-134 NOTE: End date should be 10/1/2011, per E. Connell/JSC (Ed., 9/16/2011) NOTE: Start date should be 12/11/2007 (from 6/02/2008) per B. Woolford/S. Steinberg-Wright/JSC (5/19/2009) NOTE: End date should be 06/30/2012 (from 9/30/2011) per B. Woolford/S. Steinberg-Wright/JSC (4/17/2009) NOTE: End date corrected to 9/30/2011 (from 9/30/2010) per S. Steinberg-Wright/JSC (4/2009)		
<b>Key Personnel Changes/Previous PI:</b>	Leah Norrell is no longer a Co-Investigator. Miranda Mesloh has been added as the current Co-Investigator.		
<b>COI Name (Institution):</b>	Young, Karen ( Lockheed-Martin / NASA Johnson Space Center ) Mesloh, Miranda ( Lockheed-Martin / NASA Johnson Space Center )		
<b>Grant/Contract No.:</b>	Directed Research		
<b>Performance Goal No.:</b>			
<b>Performance Goal Text:</b>			

Task Description:	<p>The primary objective of this project is to provide information pertaining to changes in seated height due to spinal elongation in a microgravity environment. The proposed experiment aims to collect seated height data for subjects exposed to microgravity environments, provide information relating to seated height rate of change over time, and feed new information regarding the elongation of the spine forward into the design of Constellation systems. Historical data indicates that spinal elongation occurs when crewmembers are subjected to microgravity. In as little as two days, the typical crewmember will exhibit increases in stature of up to 3 percent. However, data has been collected only for crewmembers in standing postures, and a limited pool of subjects was available.</p> <p>Due to the criticality of seated height in the design of the Crew Exploration Vehicle (CEV), a better understanding of the effects of microgravity on seated height is necessary. Small changes in seated height that may not have impacted crew accommodation in previous programs will have significant effects on crew accommodation due to the layout of seats in the CEV.</p> <p>The proposed study will directly measure changes in seated height for crewmembers in the Shuttle cockpit. An anthropometer will be used to record measurements to the top of the head of a seated subject, and an orthogonal photograph will be taken in order to measure seated height based on scaling references of known sizes as well as verify the posture and positioning remained consistent throughout the study.</p> <p>Data gained from this study will provide better information to CEV designers. Accurate measurements of crew seated height will be valuable for vehicle and habitation designers for future programs as well.</p> <p>See also <a href="http://www.nasa.gov/">http://www.nasa.gov/</a></p>
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	<p>This study will provide information on spinal elongation and how space flight will affect accommodation requirements. This information may also be useful for people who suffer from back pain and back compression on Earth.</p>
Task Progress:	<p>During the FY10, this project has been able to collect data during 4 Shuttle flights for a total of 22 participants. Thirty-one subjects have consented to participate in the spinal elongation experiment, including ISS backup crewmembers. The PI team has been able to collect pre-flight, in-flight, and post-flight data from 22 subjects. The PI team was expected to achieve the total number of subjects for this experiment this fiscal year; however, due to Shuttle launch dates slipping, not all participating subjects were able to complete this experiment in FY10.</p> <p>The in-flight data from the four Shuttle flights was used to determine preliminary results for the change in seated height due to microgravity. These preliminary results were also presented at the Aerospace Medical Association (AsMA) meeting. The results of the simulated microgravity flights, completed in FY09, were also presented at the Human Factors and Ergonomics Society conference.</p>
Bibliography Type:	Description: (Last Updated: 03/25/2020)
Abstracts for Journals and Proceedings	<p>Young K, Mesloh M, Rajulu S. "Preliminary Results of the Effect of Spinal Elongation in Microgravity on Seated Height." Aerospace Medical Association (AsMA) 81st Annual Meeting., Phoenix, AZ, May 9-13, 2010. Aviation, Space, and Environmental Medicine 2010 Mar;81(3):336. , Mar-2010</p>
Papers from Meeting Proceedings	<p>Young KS, Mesloh M, Rajulu S. "Development of methodology to gather seated anthropometry data in a microgravity environment." Presented at the 3rd International Conference on Applied Human Factors and Ergonomics (AHFE), Miami, Florida, 17-20 July 2010. Conference proceedings. 3rd International Conference on Applied Human Factors and Ergonomics (AHFE), July 2010. , Jul-2010</p>