

Fiscal Year:	FY 2011	Task Last Updated:	FY 11/19/2010
PI Name:	Czeisler, Charles A. M.D., Ph.D.		
Project Title:	Sleep-Wake Actigraphy and Light Exposure During Spaceflight		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Behavior and performance		
Joint Agency Name:	TechPort:	No	
Human Research Program Elements:	(1) HFBP :Human Factors & Behavioral Performance (IRP Rev H)		
Human Research Program Risks:	(1) BMed :Risk of Adverse Cognitive or Behavioral Conditions and Psychiatric Disorders (2) Sleep :Risk of Performance Decrements and Adverse Health Outcomes Resulting from Sleep Loss, Circadian Desynchronization, and Work Overload		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	caczeisler@rics.bwh.harvard.edu	Fax:	FY 617-732-4015
PI Organization Type:	UNIVERSITY	Phone:	617-732-4013
Organization Name:	Brigham and Women's Hospital/Harvard Medical Center		
PI Address 1:	Division of Sleep Medicine		
PI Address 2:	221 Longwood Ave., Ste. 438		
PI Web Page:			
City:	Boston	State:	MA
Zip Code:	02115-5804	Congressional District:	8
Comments:			
Project Type:	FLIGHT	Solicitation / Funding Source:	98-HEDS-02
Start Date:	01/24/2001	End Date:	07/31/2012
No. of Post Docs:	0	No. of PhD Degrees:	1
No. of PhD Candidates:	0	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
Contact Monitor:	Leveton, Lauren	Contact Phone:	
Contact Email:	lauren.b.leveton@nasa.gov		
Flight Program:	Shuttle/ISS		
Flight Assignment:	<p>STS 129, 130, 131, 132 ; ISS increments 22-24 (add'l flight info per PI 11/2009)</p> <p>STS 126, STS 127, STS 128 ; ISS Increments 18-21 (add'l flight info per PI office, 11/2008)</p> <p>STS 122, STS 123, STS 124, STS 125; ISS Increment 17 (add'l flight info per PI office, 1/2008)</p> <p>STS 116, STS 118, STS 120; ISS Increments 14, 15, 16 (add'l flight info provided 11/06)</p> <p>STS 121, STS 115; ISS Increments 13-14</p> <p>STS 104, STS 109, STS 111, STS 112, STS 113, STS 114</p> <p>NOTE: End date is 7/31/2012 per PI/CoI (Ed., 10/27/11)</p> <p>NOTE--end date should be around 4/30/2012 per JSC (11/08)</p>		
Key Personnel Changes/Previous PI:	Laura K. Barger, Ph.D. is assigned as Co-Principal Investigator (1/2008 report).		

COI Name (Institution):	Barger, Laura (Co-PI: Harvard Medical School) Wright, Kenneth Ph.D. (University of Colorado) Ronda, Joseph M.S. (Harvard Medical School) Evans, Erin Ph.D. (Brigham and Women's Hospital)
Grant/Contract No.:	NCC9-119
Performance Goal No.:	
Performance Goal Text:	
Task Description:	Subjects will wear a small light-weight activity and light recording device for the entire duration of their mission. They will complete a sleep log each day on Shuttle flights and for three 1-week periods during an ISS mission. The sleep-wake activity and light exposure patterns obtained in-flight will be compared with baseline data collected for two weeks at L-90 and from L-11 through L-0. Recovery from space flight will also be assessed from R+0 through R+7. These data should help us better understand the effects of space flight on sleep as well as aid in the development of effective countermeasures for both short and long-duration space flight. See also http://www.nasa.gov/
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	<p>The success and effectiveness of manned space flight depends on the ability of crew members to maintain a high level of cognitive performance and vigilance while operating and monitoring sophisticated instrumentation. Astronauts, however, commonly experience sleep disruption and may experience misalignment of circadian phase during space flight. Both of these conditions are associated with impairment of alertness and cognitive performance. A survey of 58 crew members from 9 shuttle missions revealed that most suffered from sleep disruption and were unable to sleep more than six hours per day of flight as compared to 7.9 hours per day on the ground. Ground-based studies have revealed that chronic exposure to such partial sleep loss results in progressive decrements in neurobehavioral performance during waking hours. In fact, nineteen percent of crew members on single shift missions and 50 percent of the crew members in dual shift operations have resorted to sleeping pill usage (principally benzodiazepines) during their missions, which represents more than 40% of all medication used by shuttle crew. Although benzodiazepines are effective hypnotics, their adverse next-day side effects include sedation, performance decrements, amnesia, and distortions in the sleep EEG. Relatively little is known of the severity or cause of space flight-induced insomnia in short duration mission, and less is known about the effect of long-duration space flight on sleep and circadian rhythm organization. This experiment will use state-of-the-art ambulatory technology to monitor sleep-wake activity patterns and light exposure in crew members aboard Space Shuttle and ISS missions.</p> <p>The proposed research could have significant implications for both sleep disorders medicine and space life sciences. The results of the proposed research could lead to the development of a new treatment regimen for sleep disturbances of various etiologies during space flight, which could enable crew members to avoid the decrements in alertness and performance associated with sleep deprivation. This work could therefore have a profound impact on the health, productivity and safety not only of astronauts during space flight, but also of other groups with a high prevalence of insomnia, such as shift workers and older people.</p>
Task Progress:	In the past year (January 1, 2010- November 19, 2010), 10 subjects on 3 Space Shuttle flights (STS-130, STS-131, and STS-132) completed the protocol. Seven additional crewmembers assigned to STS-133, and STS-134 have volunteered to participate in this protocol. Additionally, 18 ISS crewmembers have completed this experiment, to date and data collection is ongoing for 3 additional ISS crewmembers. Actigraphy data continue to be scored and are undergoing interpretation and analysis. Computer programming continues that will allow direct input of Actiwatch data into our Computer Performance Simulation Software. This will allow us to estimate the circadian phase of each subject pre-launch, in-flight and post-flight.
Bibliography Type:	Description: (Last Updated: 12/13/2023)
Abstracts for Journals and Proceedings	Barger LK, Wright KP Jr, Walsh L, Kubey A, Czeisler CA. "Sleep on the Space Shuttle and the International Space Station." Presented at 20th Congress of the European Sleep Research Society, Lisbon, Portugal, September 14-18, 2010. 20th Congress of the European Sleep Research Society, Lisbon, Portugal, September 14-18, 2010. , Sep-2010
Abstracts for Journals and Proceedings	Barger LK, Wright KP Jr, Czeisler CA. "Sleep and Circadian Rhythms in Crewmembers Aboard Space Shuttle and International Space Station Missions." Presented at the 12th Biennial Meeting, Society for Research on Biological Rhythms, Destin, Florida, May 22-26, 2010. 12th Biennial Meeting, Society for Research on Biological Rhythms, Destin, Florida, May 22-26, 2010. , May-2010