Fiscal Year:	FY 2012	Task Last Updated:	FY 07/11/2012
PI Name:	Hunter, Jean Ph.D.		
Project Title:	Effects of Retronasal Smelling, Varie	ty and Choice on Appetite and Satiety	
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline Element/Subdiscipline:	HUMAN RESEARCHSpace Huma	n Factors Engineering	
Joint Agency Name:		TechPort:	No
Human Research Program Elements:	(1) SHFH:Space Human Factors & H	abitability (archival in 2017)	
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:	14853-5701	Congressional District:	22
Comments:			
Project Type:	Ground	Solicitation / Funding Source:	2009 Crew Health NNJ09ZSA002N
Start Date:	05/01/2011	End Date:	04/30/2014
No. of Post Docs:	1	No. of PhD Degrees:	
No. of PhD Candidates:	1	No. of Master' Degrees:	
No. of Master's Candidates:		No. of Bachelor's Degrees:	
No. of Bachelor's Candidates:	4	Monitoring Center:	NASA JSC
Contact Monitor:	Douglas, Grace	Contact Phone:	
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Flight Program:			
Flight Assignment:	NOTE: New end date is 4/30/2014, per NSSC information (Ed., 1/31/13)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Binsted, Kim (University of Hawaii, Honolulu) Spies, Rupert (Cornell University) Halpern, Bruce (Cornell University)		
Grant/Contract No.:	NNX11AE53G		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	 Menu fatigue and its sequelae, lower food intake and weight loss, have been documented in military, polar exploration, and space settings, and among subjects in bed rest studies. Isolation, confinement, stress, and low acceptability of available foods amplify menu fatigue. Adequate levels of acceptability, variety, and usability are required to maintain food intake and crew health and performance. We wish to use isolated and confined subjects at the NASA bed rest facility, and different subjects in a Mars analog environment, to explore three issues: 1) the relationship between nasal patency and smelling (orthonasal and retronasal) in the microgravity analog of bed rest and in the isolation/confinement setting of a Mars-like habitat, 2) the effect of orthonasal and retronasal smelling on appetite under conditions of menu fatigue, and 3) the hypothesis that a bulk ingredient based food system, with crew-prepared foods, will improve crew food satisfaction and mitigate menu fatigue. The last study will include an ESM cost comparison of crew-prepared and prepackaged food systems. Study #1 on smelling and nasal patency reopens an earlier finding (Vickers et al, 2001) that taste, olfaction and trigeminal response are unaffected by fluid shifts resulting from bed rest. We have returned to the olfaction aspect of that question with objective measurements of nasal cavity dimensions and nasal airway resistance, with a broader and more closely food-related set of odorants, and by adding tests of retronasal smelling which is more representative of odorant preception during eating. Study #2 seeks to link dorant acceptability ratings for pure, food-related dorants to bed-rested subjects' appetite, or dunconnected with the bed rest menu. Jubjects will also be asked to observe and smell their meals, then rate their apptite and desire to eat the meal. These measurements are taken during the pre-bed rest ambulatory period. Juring early and late bed rest when fluid shifts have stabilized and men	
Rationale for HRP Directed Research:		
Research Impact/Earth Benefits:	Our investigation of nasal patency, olfaction, and appetite in bed rested subjects is generally relevant to the care and nutrition of patients confined to bed for medical reasons. Our research on foods and cooking for long term planetary surface missions is relevant to the provisioning of small isolated groups on Earth and generally relevant to the adventure tourism industry.	
Task Progress:	Data was acquired for only one bed rested subject in the last quarter of 2011 due to a hold on admitting additional subjects while an internal review unrelated to the olfaction study was being conducted. During early 2012, nasal patency data was analyzed fully for this subject. Preliminary findings show that nasal cavity dimension was reduced by head-down tilted bed rest with a simultaneous increase in nasal airflow resistance. Bed rest produced an immediate, marked reduction in nasal cavity volume for both left and right nostrils. Over several days the average nasal cavity volume recovered somewhat, but a net reduction persisted throughout bed rest. Odorant Identification data was assembled and is awaiting comparison with data from future subjects. Meal questionnaire scores were assembled and showed only a slight diminishment in interest by the subject for some meal items very late in bed rest (around 65 days). The website for the analog mission arm of the study was set up at http://manoa.hawaii.edu/hi-seas/">http://manoa.hawaii.edu/hi-seas/">http://manoa.hawaii.edu/si applications for the analog crew. Around 700 responses were received and are still being evaluated in March 2012. An ideal habitat site was identified and the permitting process initiated. The site, near a cinder cone in the Saddle Road area of Mauna Loa, is not ecologically pristine nor culturally sensitive. Design of the HI-SEAS habitat, which will be a temporary, portable analog habitat testbed designed to accommodate 6 test subjects for isolation/confinement analog research, was initiated. Current design alternatives include concepts based on converted shipping containers and on geodesic dome structures. Engineering evaluation of the power, water, and logistics requirements are in progress.	
Bibliography Type:	Description: (Last Updated: 03/01/2018)	
Abstracts for Journals and Proceedings	Caldwell BJ, Halpern BP, Binsted K, Hunter JB. "Fluid Shift to the Upper Body Reduces Nasal Cavity Dimension and Airflow in Head-Down Bed Rest Subjects." Presented at the 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	