

<b>Fiscal Year:</b>	FY 2011	<b>Task Last Updated:</b>	FY 07/14/2011
<b>PI Name:</b>	Hunter, Jean Ph.D.		
<b>Project Title:</b>	Effects of Retronasal Smelling, Variety and Choice on Appetite and Satiety		
<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>	None		
<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>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>		
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<b>Flight Program:</b>			
<b>Flight Assignment:</b>			
<b>Key Personnel Changes/Previous PI:</b>			
<b>COI Name (Institution):</b>	Binsted, Kim ( University of Hawaii, Honolulu ) Spies, Rupert ( Cornell University ) Halpern, Bruce ( Cornell University )		
<b>Grant/Contract No.:</b>	NNX11AE53G		
<b>Performance Goal No.:</b>			
<b>Performance Goal Text:</b>	<p>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.</p> <p>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.</p>		

Task Description:	<p>The last study will include an ESM cost comparison of crew-prepared and prepackaged food systems.</p> <p>The first bed rest study reopens an earlier finding (Vickers et al, 2001) that taste, olfaction and trigeminal response are unaffected by fluid shifts resulting from bed rest. We propose to return 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 measuring retronasal smelling which is more representative of odorant perception during eating.</p> <p>The second bed rest study seeks to link odorant acceptability ratings for pure, food-related odorants to bed-rested subjects' appetite, or desire to eat a meal. Subjects will rate the pleasantness and perceived food-relatedness of odorants connected and unconnected with the bed rest menu. Subjects will also be asked to observe and smell their meals, then rate their appetite and desire to eat the meal. These measurements will be taken during pre-bed rest, during early and late bed rest when fluid shifts have stabilized and menu fatigue is increasing, and during the recovery period. Odorants used will include the vapor phase odors of foods on the bed rest menu, other food-related odorants not related to the bed rest menu, and pure odorants as controls. We expect to find shifts in odorant acceptability over the course of the study, testing the hypothesis that odorants related to the menu will drop in acceptability over time due to menu fatigue.</p> <p>Our main analog study will test the hypothesis that allowing the crew to prepare some of their own meals will mitigate menu fatigue and increase food satisfaction. An analog crew of 5 volunteers will inhabit the Mars Desert Research Station analog site for 4 months. After an initial acclimation period they will consume meals of two different types: meals containing only prepackaged foods including NASA foods and commercial packaged foods from the bed rest study and meals prepared by the crew from shelf-stable ingredients. Food preparation time, recipes used, acceptability and intake of each food, and mood will be tracked; estimated nutritional intake will be tracked from intake and recipe data. We will also generate an ESM cost comparison of the two food systems from crew time, water, and usage data and estimates of power.</p> <p>Finally, analog crewmembers will undergo the same airway patency and odorant identification tests as the bed rest subjects, both to provide an ambulatory isolated/confined control and to detect, if possible, effects of habituation to environmental odors upon perception. Analog subjects will also replicate the study of odorant liking, food-relatedness, and appetite done on the bed rested subjects.</p>
	Rationale for HRP Directed Research:
	Research Impact/Earth Benefits:
	Task Progress: New project for FY2011.
	Bibliography Type: Description: (Last Updated: 03/01/2018)