

<b>Fiscal Year:</b>	FY 2017	<b>Task Last Updated:</b>	FY 10/05/2016
<b>PI Name:</b>	Britten, Richard Ph.D.		
<b>Project Title:</b>	Hadron-induced Impairment of Executive Function: Role of Perturbed Neurotransmission and the Exacerbating Impact of Sleep Deprivation		
<b>Division Name:</b>	Human Research		
<b>Program/Discipline:</b>			
<b>Program/Discipline--Element/Subdiscipline:</b>	HUMAN RESEARCH--Radiation health		
<b>Joint Agency Name:</b>	<b>TechPort:</b>	No	
<b>Human Research Program Elements:</b>	(1) <b>SR</b> :Space Radiation		
<b>Human Research Program Risks:</b>	(1) <b>BMed</b> :Risk of Adverse Cognitive or Behavioral Conditions and Psychiatric Disorders		
<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>	23507-1607	<b>Congressional District:</b>	3
<b>Comments:</b>			
<b>Project Type:</b>	GROUND	<b>Solicitation / Funding Source:</b>	2013-14 HERO NNJ13ZSA002N-NSCOR Radiation
<b>Start Date:</b>	12/02/2015	<b>End Date:</b>	12/02/2019
<b>No. of Post Docs:</b>	0	<b>No. of PhD Degrees:</b>	0
<b>No. of PhD Candidates:</b>	0	<b>No. of Master' Degrees:</b>	0
<b>No. of Master's Candidates:</b>	0	<b>No. of Bachelor's Degrees:</b>	0
<b>No. of Bachelor's Candidates:</b>	0	<b>Monitoring Center:</b>	NASA JSC
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<b>Flight Program:</b>			
<b>Flight Assignment:</b>	Ed. NOTE (April 2016): Proposal modified from original NSCOR proposal, per Space Radiation Element; not an NSCOR project		
<b>Key Personnel Changes/Previous PI:</b>			
<b>COI Name (Institution):</b>	Sanford, Larry Ph.D. ( Eastern Virginia Medical School ) Wellman, Laurie Ph.D. ( Eastern Virginia Medical School )		
<b>Grant/Contract No.:</b>	NNX16AC40G		
<b>Performance Goal No.:</b>			
<b>Performance Goal Text:</b>			

<b>Task Description:</b>	<p>The proposed studies will address multiple issues of concern to NASA. These studies will determine the relative potencies of mission-relevant doses of two HZE (high energy) particles (with <math>Z &lt; 14</math>) to impair Attentional Set Shifting (ATSET). This data can be used to address central nervous system (CNS) Gap 2, and determine the likelihood of Astronauts being able to successfully conduct neurocognitive (problem-solving) tasks. The data generated on the inter-individual susceptibility to develop Hadron-induced Impairment of Executive Function (HIIEF) could be used (by others) to determine whether the dichotomous (all-or-none) induction of HIIEF requires reconsideration of the use of population Threshold Dose for dose risk estimations (CNS Gap 3).</p> <p>This study will establish the impact that SlpDep/SlpFrag has on the severity of HIIEF (CNS 8), and whether Hadron exposure will result in a diminished ability to restore SlpDep decrements in Executive Function (CNS Gap 8).</p> <p>The proposed studies will thus generate data on the likelihood that GCR (galactic cosmic radiation) exposure will result in the impairment of neurocognitive (Executive Function) tasks that will be absolutely vital for the successful completion of a deep-space mission, under conditions that are more representative of the actual mission (when individuals are suffering from perturbed sleep).</p> <p>Aim 1: Studies to determine the Impact of sleep-fragmentation on Attentional Set Shifting performance.</p> <p>Aim 2: Studies to determine the Impact of sleep fragmentation occurring at pre- or post-HZE exposure on Attentional Set Shifting performance.</p> <p>Aim 3: Studies to determine the Impact of HZE exposure on sleep related electroencephalogram (EEG), and sleep homeostasis.</p>
<b>Rationale for HRP Directed Research:</b>	
<b>Research Impact/Earth Benefits:</b>	
<b>Task Progress:</b>	<p>This is the first reporting period for this grant.</p> <p>NASA funds arrived at Eastern Virginia Medical School (EVMS) on April 8 2016. Upon receipt of funds, the documentation to hire the two research assistants was initiated. Two candidates were employed effective July 1 2016.</p> <p>Final IACUC (Institutional Animal Care and Use Committee) approval to cover the work outlined in this proposal was awarded on April 4 2016 and forwarded to NASA on April 29 2016.</p> <p>The Sleep Deprivation apparatus from Lafayette Instruments were ordered in June 2016 and arrive mid-August 2016.</p> <p>On July 19 2016, 110 rats arrived at EVMS and began the pre-screening protocol. 80 of these rats are predicted to have sufficient Attentional Set Shifting performance to be shipped to Brookhaven National Laboratory (BNL) and irradiated (with and without sleep deprivation) between November 3 and Nov 9, 2106. We anticipate to have data from these rats by the end of Feb 2017.</p> <p>We plan to prescreen a further 80 rats in Feb/March of 2017 and irradiate them at BNL April/May 2017.</p>
<b>Bibliography Type:</b>	Description: (Last Updated: 02/21/2024)