

<b>Fiscal Year:</b>	FY 2019	<b>Task Last Updated:</b>	FY 04/19/2019
<b>PI Name:</b>	Norcross, Jason M.S.		
<b>Project Title:</b>	Validation of Fitness for Duty Standards Using Pre- and Post-Flight Capsule Egress and Suited Functional Performance Tasks in Simulated Reduced Gravity		
<b>Division Name:</b>	Human Research		
<b>Program/Discipline:</b>			
<b>Program/Discipline--Element/Subdiscipline:</b>			
<b>Joint Agency Name:</b>		<b>TechPort:</b>	No
<b>Human Research Program Elements:</b>	(1) <b>HHC:</b> Human Health Countermeasures		
<b>Human Research Program Risks:</b>	(1) <b>EVA:</b> Risk of Injury and Compromised Performance due to EVA Operations (IRP Rev F) (2) <b>HFBP Bmed:</b> Risk of Adverse Cognitive or Behavioral Conditions and Psychiatric Disorders (IRP Rev J) (3) <b>HHC-Sensorimotor:</b> Risk of Impaired Control of Spacecraft/Associated Systems and Decreased Mobility Due to Vestibular/Sensorimotor Alterations Associated with Spaceflight (IRP Rev J)		
<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>	77058-3711	<b>Congressional District:</b>	36
<b>Comments:</b>			
<b>Project Type:</b>	FLIGHT	<b>Solicitation:</b>	2017 HERO 80JSC017N0001-BPBA Topics in Biological, Physiological, and Behavioral Adaptations to Spaceflight. Appendix C
<b>Start Date:</b>	01/30/2019	<b>End Date:</b>	05/30/2020
<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>			
<b>Flight Assignment:</b>			
<b>Key Personnel Changes/Previous PI:</b>			
<b>COI Name (Institution):</b>	Abercromby, Andrew Ph.D. ( NASA Johnson Space Center ) Bloomberg, Jacob Ph.D. ( NASA Johnson Space Center ) Reschke, Millard Ph.D. ( NASA Johnson Space Center ) Ryder, Jeffrey Ph.D. ( NASA Johnson Space Center ) Young, Millennia Ph.D. ( NASA Johnson Space Center )		
<b>Grant/Contract No.:</b>	Internal Project		
<b>Performance Goal No.:</b>			

**Performance Goal Text:****Task Description:**

Rigorous adherence to available inflight countermeasures has effectively mitigated losses or maintained muscle strength and aerobic capacity in some returning long-duration International Space Station (ISS) crewmembers; however, all astronauts demonstrate significant decrements in functional performance upon return to a gravity environment. These losses in functional performance can be largely attributed to neurovestibular / sensorimotor deficits that can take days or weeks from which to recover and for which there is no current operational countermeasure. Although these losses are tolerable for current land-based returns to Earth, where ground personnel can quickly support the crew at the landing site, this will not be the case for future off-nominal water-based Orion landings or for nominal Mars surface landings, both of which will require crewmembers to be capable of egressing their landing vehicle unassisted.

Quantification of astronauts' post-landing functional capacity including ability to perform an unassisted capsule egress and critical planetary extravehicular activity (EVA) tasks is necessary to design concepts of operation for Moon and Mars exploration mission systems and ultimately to promote exploration mission success. These results can then be reviewed in combination with other pre-flight, in-flight, and post-landing measures and determinants of health and performance (e.g., sleep, nutrition, exercise) to help develop and select necessary countermeasures capable of protecting all crewmembers or to identify characteristics (both behavioral and inherent) that might allow for selection of crew dependent on mission objectives.

Data collected in this proposal will provide unique data on unassisted capsule egress while wearing an unpressurized launch, entry, abort (LEA) suit in Earth's gravity and on EVA-relevant functional task performance by testing astronauts shortly after return to Earth while suited and pressurized in a simulated reduced gravity analog. The research product will be a temporal profile of unassisted capsule egress and planetary EVA task performance pre-flight and at multiple post-landing intervals, the timing of which will be determined based on post-landing logistics and coordination with other investigations. Data will be collected for spaceflight missions ranging from 2 months, 6 months, and up to 1 year in duration. Results of the proposed study will be used in combination with subsequent definition and design of exploration mission systems and operations concepts to define data-based Fitness for Duty standards.

**Rationale for HRP Directed Research:****Research Impact/Earth Benefits:****Task Progress:**

New project for FY2019.

**Bibliography Type:**

Description: (Last Updated: 05/30/2017)