Fiscal Year:	FY 2009	**Task Last Updated:**	FY 05/08/2009
PI Name:	Moore, Steven T. Ph.D.		
Project Title:	Galvanic Vestibular Stimulation (GVS) as an analogue of post-flight sensorimotor dysfunction		
Division Name:	Human Research		
Program/Discipline:	NSBRI		
Program/Discipline--Element/Subdiscipline:	NSBRI--Sensorimotor Adaptation Team		
Joint Agency Name:		**TechPort:**	Yes
Human Research Program Elements:	(1) **HHC**:Human Health Countermeasures		
Human Research Program Risks:	(1) **Sensorimotor**:Risk of Altered Sensorimotor/Vestibular Function Impacting Critical Mission Tasks (Revised as of IRP Rev M)		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	10029	**Congressional District:**	14
Comments:	NOTE: PI moved to Central Queensland University, Australia, July 2016.		
Project Type:	GROUND	**Solicitation / Funding Source:**	2007 Crew Health NNJ07ZSA002N
Start Date:	05/01/2008	**End Date:**	04/30/2012
No. of Post Docs:	2	**No. of PhD Degrees:**	0
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:**	NSBRI
Contact Monitor:		**Contact Phone:**	
Contact Email:			
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Bloomberg, Jacob (NASA JSC) Curthoys, Ian (University of Sydney)		
Grant/Contract No.:	NCC 9-58-SA01603		
Performance Goal No.:			
Performance Goal Text:			
Task Description:	The recent NASA Small Assessment Team (SAT) and the draft NASA Human Research Program (HRP) Integrated Research Plan evaluated sensorimotor risks for future exploration class missions. A high priority was placed on the development and validation of ground-based operational tests to determine the effects of long-term microgravity exposure on sensorimotor performance, particularly manned control or supervision of spacecraft during docking and landing maneuvers. Head down bed rest (HDBR) was suggested as the ground-based analogue with which to conduct these tests. However, our recent artificial gravity study has demonstrated that HDBR does not reproduce sensorimotor deficits observed following spaceflight. There is currently no operational analogue of post-flight sensorimotor effects, and the primary aim of this proposal is to deliver such a system to facilitate the sensorimotor risk assessments mandated by the NASA SAT and HRP, as well as for crew training and countermeasure development. To this end we have		

Task Description:	developed a prototype ambulatory system that generates a reversible sensorimotor deficit. The system uses Galvanic vestibular stimulation (GVS), which modulates afferent vestibular input with a pseudorandom current delivered via surface electrodes placed on the skin behind each ear. The GVS analogue has been designed such that the sensorimotor perturbation delivered accurately reproduces postural, locomotor, gaze and perceptual deficits observed in astronauts following short and long duration missions, without inducing significant motion sickness symptoms. In this proposal we aim to bring the GVS sensorimotor analogue to operational readiness by answering the following critical questions: (i) What are the optimal parameters for a single exposure to the GVS analogue? (ii) What is the long-term response to GVS? (iii) How well does the GVS analogue reproduce post-flight deficits in shuttle landing performance?
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	The NASA Human Research Program has identified the development of ground-based analogs of the effects of microgravity exposure on sensorimotor function as a high priority. Our studies have demonstrated that ambulatory Galvanic Vestibular Stimulation (GVS) shows significant potential as a high-fidelity simulation of postural, locomotor, perceptual and oculomotor deficits observed in astronauts after return from spaceflight. Successful completion of this project will deliver an effective, safe, and reversible analog of post-flight sensorimotor dysfunction that could be integrated into astronaut training to improve the fidelity of ground-based mission simulations. In addition, the GVS system may also have potential as a reversible model of vestibular pathology.
Task Progress:	In the first year of this project we have obtained data from 19 subjects to determine tolerability of Galvanic Vestibular Stimulation (GVS), and the effect of GVS on cognitive function. In April 2009 we will perform experiments in the Vertical Motion Simulator at NASA Ames during shuttle landings with and without GVS. Our subjects will include veteran astronauts, NASA test pilots, and US Air Force pilots.
Bibliography Type:	Description: (Last Updated: 09/07/2020)