

Fiscal Year:	FY 2008	Task Last Updated:	FY 05/05/2008
PI Name:	Stowe, Raymond Ph.D.		
Project Title:	Space Flight-Induced Reactivation of Latent Epstein-Barr Virus		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Operational and clinical research		
Joint Agency Name:	TechPort:	No	
Human Research Program Elements:	(1) HHC :Human Health Countermeasures		
Human Research Program Risks:	(1) Immune :Risk of Adverse Health Event Due to Altered Immune Response		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	77568-3318	Congressional District:	22
Comments:			
Project Type:	FLIGHT	Solicitation / Funding Source:	98-HEDS-02
Start Date:	07/01/2004	End Date:	01/22/2010
No. of Post Docs:	No. of PhD Degrees:		
No. of PhD Candidates:	No. of Master' Degrees:		
No. of Master's Candidates:	No. of Bachelor's Degrees:		
No. of Bachelor's Candidates:	Monitoring Center: NASA JSC		
Contact Monitor:	Meck, J@n	Contact Phone:	281-244-5405
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Flight Program:	Shuttle/ISS		
Flight Assignment:	STS-122, STS-123, STS-124, and STS-125 STS-108, -109, -110, -111, -113, -114; -116; -118; ISS-5, -6 In flight development phase (data collection has begun) NOTE: End date changed to 1/22/2010 per J. Dardano/JSC (1/2009)		
Key Personnel Changes/Previous PI:	Raymond Stowe replaced Alan Barrett as PI, effective July 2004 (per info from S. McCollum/M. Anderson, 12/2006). See also Barrett for FY02-04 information/reports.		
COI Name (Institution):	Pierson, Duane L (NASA Johnson Space Center)		
Grant/Contract No.:	NNJ06HB73A		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	The majority of humans are infected with Epstein-Barr virus (EBV) early in life and thereafter carry the virus in a latent form. Reactivation of latent EBV may be an important threat to crew health during extended space missions. EBV is the causative agent of infectious mononucleosis as well as nasopharyngeal carcinoma, Burkitt's lymphoma, and different kinds of B-lymphocyte lymphomas in immunosuppressed individuals. Control of replication in vivo is mediated primarily by EBV-specific cytotoxic T-lymphocytes, and severe clinical symptoms have been associated with reactivation of latent viruses in patients with defective cellular immunity. Decreased cellular immune function has been reported both during and after space flight. Preliminary studies have demonstrated increased EBV shedding in saliva as well as increased antibody titers to EBV lytic proteins. Based on these observations, we hypothesize that the combined effects of microgravity along with associated physical and psychological stress will decrease EBV-specific T-cell immunity and reactivate latent EBV in infected B- lymphocytes. The specific aims to test this hypothesis are: (1) determine if antibody titers to EBV-specific antigens are increased after space flight; (2) determine T-lymphocyte immunocompetence using a EBV-specific autologous T-cell killing assay; (3) characterize the viral burden and gene expression in peripheral blood cells using PCR/RT-PCR; and (4) measure stress hormones in plasma and urine. To determine the mechanisms underlying altered virus-specific T cell immunity and reactivation of latent EBV in B lymphocytes. See also http://www.nasa.gov/
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	This experiment will address fundamental questions on spaceflight and virus-specific immunity. One potential concern is the development of a virally associated disease or lymphoma within an infected individual. In addition, reinfection or transmission to a previously uninfected individual (resulting in primary infection) may be another concern. Thus, spaceflight may result in an increased frequency and/or severity of both primary and reactivated disease. If increased reactivation and clonal expansion of infected B- lymphocytes is detected, then pharmacological measures can be developed and instituted prior to onset of overt clinical disease.
Task Progress:	Our experiment has been manifested on several more Shuttle missions including STS-122, STS-123, STS-124, and STS-125. Completed missions included STS-116 and STS-118. We have also enrolled subjects from STS-126.
Bibliography Type:	Description: (Last Updated: 03/07/2019)
Abstracts for Journals and Proceedings	Stowe RP, Sams CF, Pierson DL. "Cytomegalovirus reactivation in astronauts." NASA Human Research Program Investigators' Workshop, League City, TX, January 2008. NASA Human Research Program Investigators' Workshop Proceedings, January 2008. , Jan-2008
Abstracts for Journals and Proceedings	Crucian B, Stowe R, Mehta S, Uchakin P, Quiarte H, Pierson D, Sams C. "Validation of Procedures for Monitoring Crewmember Immune Function." NASA Human Research Program Investigators' Workshop, League City, TX, January 2008. NASA Human Research Program Investigators' Workshop Proceedings, January 2008. , Jan-2008
Abstracts for Journals and Proceedings	Crucian B, Stowe R, Mehta S, Uchakin P, Quiarte H, Yetman D, Pierson D, Sams C. "Immune function changes during a spaceflight-analog undersea mission." NASA Human Research Program Investigators' Workshop, League City, TX, January 2008. NASA Human Research Program Investigators' Workshop Proceedings, January 2008. , Jan-2008
Abstracts for Journals and Proceedings	Mehta SK, Aggarwal BB, Feiveson AH, Hammond DK, Castro VA, Stowe RP, Pierson DL. "Plasma cytokine levels in astronauts before and after spaceflight." NASA Human Research Program Investigators' Workshop, League City, TX, January 2008. NASA Human Research Program Investigators' Workshop Proceedings, January 2008. , Jan-2008
Articles in Peer-reviewed Journals	Stowe RP, Kozlova EV, Yetman DL, Walling DM, Goodwin JS, Glaser R. "Chronic herpesvirus reactivation occurs in aging. " Exp Gerontol. 2007 Jun;42(6):563-70. Epub 2007 Jan 30. PMID: 17337145 , Jun-2007
Articles in Peer-reviewed Journals	Uchakin PN, Stowe RP, Paddon-Jones D, Tobin BW, Ferrando AA, Wolfe RR. "Cytokine secretion and latent herpes virus reactivation with 28 days of horizontal hypokinesia." Aviat Space Environ Med. 2007 Jun;78(6):608-12. PMID: 17571663 , Jun-2007
Articles in Peer-reviewed Journals	Mehta SK, Crucian B, Pierson DL, Sams C, Stowe RP. "Monitoring immune system function and reactivation of latent viruses in the Artificial Gravity Pilot Study." J Gravit Physiol. 2007 Jul;14(1):P21-5. PMID: 18372687 , Jul-2007
Articles in Peer-reviewed Journals	Stowe RP, Yetman DL, Storm WF, Sams CF, Pierson DL. "Neuroendocrine and immune responses to 16-day bed rest with realistic launch and landing G profiles." Aviat Space Environ Med. 2008 Feb;79(2):117-22. PMID: 18309909 , Feb-2008
Articles in Peer-reviewed Journals	Crucian B, Lee P, Stowe R, Jones J, Effenhauser R, Widen R, Sams C. "Immune system changes during simulated planetary exploration on Devon Island, high arctic." BMC Immunol. 2007 May 23;8:7. PMID: 17521440 , May-2007