

Fiscal Year:	FY 2011	Task Last Updated: FY 08/10/2011	
PI Name:	Sams, Clarence Ph.D.		
Project Title:	Consequences of Long-Term Confinement and Hypobaric Hypoxia on Immunity in the Antarctic Concordia Environment (CHOICE)		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Biomedical countermeasures		
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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Organization Name:	NASA Johnson Space Center		
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City:	Houston	State:	TX
Zip Code:	77058-3607	Congressional District:	22
Comments:			
Project Type:	Ground	Solicitation / Funding Source:	Directed Research
Start Date:	10/01/2008	End Date:	09/30/2012
No. of Post Docs:	0	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:	NASA JSC
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Flight Program:			
Flight Assignment:	NOTE: End date is 9/30/2012 per Col and HRP Master Task List dtd 7/12/2011 (Ed., 8/8/2011)		
Key Personnel Changes/Previous PI:	Alexander Choukèr, Department of Anaesthesiology, Hospital of the Ludwig-Maximilians-University of Munich, Germany, is the European (ESA) PI. Clarence Sams is the U.S. PI.		
COI Name (Institution):	Chouker, Alexander (Co-PI: Hospital of the Ludwig-Maximilians-University, Munich, Germany) Baatout, Sarah (SCK-CEN, Belgium) Campolongo, Patricia (University of Rome "La Sapienza", Italy) Crucian, Brian (NASA Johnson Space Center) Duchamp, Claude (Université Claude Bernard, Lyon, France) Gunga, Hanns-Christian (University of Berlin, Charité, Germany) Kaufmann, Ines (Ludwig-Maximilians-University of Munich, Germany) Kreth, Simone (Ludwig-Maximilians-University of Munich, Germany) Pierson, Duane (NASA Johnson Space Center) Praun, Siegfried (V&F Medical, Austria) Raccurt, Mireille (Université Claude Bernard, Lyon, France) Schachtner, Thomas (Ludwig-Maximilians-University of Munich, Germany) Schelling, Gustav (Ludwig-Maximilians-University of Munich, Germany) Thiel, Manfred (Ludwig-Maximilians-University of Munich, Germany)		

Grant/Contract No.:	Directed Research
Performance Goal No.:	
Performance Goal Text:	
Task Description:	<p>The vulnerability of totally isolated wintering groups in Antarctica is a concern alike of those needing major consideration when planning health care and health monitoring during long-term space flights, manned lunar exploration and potential future “extraterrestrial” settlement. The recently published medical statistics of Antarctic wintering-over teams in the last decades and new research reports indicate that the health and the immune system are affected under the conditions of confinement in the pole regions. Beside the consequences of confinement on stress-dependent immune-modulation, hypobaric hypoxia may add to modulate immunity and potentially aggravate immune suppression. Therefore, this protocol seeks to investigate the consequences of long-term confinement AND hypobaric hypoxia using the opportunity of research on the CONCORDIA station. To delineate the consequences of confinement from hypoxia, this study is designed to allow for comparison of results of several earth-bound (e.g. Antarctic Georg Neumayer Station) and space-flight control groups in former and ongoing scientific studies.</p> <p>NASA participation in this study will consist of monitoring immune system dysregulation, virus specific immunity and latent viral reactivation. This panel of assays is similar to those being used to monitor astronauts participating in the Integrated Immune in-flight study. This homology allows a direct flight-ground comparison to enable validation of Concordia as a ground-based spaceflight analog for immune dysregulation. Crews deployed to winter-over at the ‘Concordia’ station (Dome C, Antarctica) will be subjects for this study. Typical winter-over is a 1 year deployment. Blood, saliva and urine samples will be collected for analysis at Concordia Station within the first few weeks of deployment, and within a few weeks before departure. Other overwinter samples were planned to be minimal, primarily collection and freezing of blood and saliva samples. Mission data will be compared to pre-mission baseline, and post-mission recovery data, both collected in Germany.</p>
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	<p>This study has assessed immune system, stress, and viral reactivation alterations in a high-fidelity ground-based spaceflight analog. Missions consist of Antarctic winterover, a 1 year deployment consisting of extreme temperatures, risk, stress, isolation, and disrupted circadian rhythms. These data should be applicable to other similar terrestrial situations, such as undersea naval missions or government/scientific deployment to extreme environment stations. Thus, the monitoring strategy developed by this study, and any future countermeasures development, should have terrestrial benefit for these analogous situations.</p>
Task Progress:	<p>All pre-, during-, and post-deployment sample processing was successfully completed on the winterover 2009 crewmembers (n=6). NASA and ESA scientists visited Concordia during the entry and exit transition phases to process these deployment samples. All necessary equipment, including a fully-operational flow cytometer, was deployed to Concordia to support the field sample processing. In an unplanned bonus, the ESA scientist physician kept the flow cytometer during the winterover period and processed additional leukocyte distribution and cytokine production samples. Training for this activity occurred during the early-winterover phase but the deployed NASA field scientist. Overwinter data were processed, and raw data files were emailed via satellite to JSC for immediate analysis. This additional data helped to define immune changes during the overwinter (consisting of 24-hour darkness) period. All pre-, and during-mission sampling were successfully processed for the winterover 2010 crewmembers (n=9). Currently NASA is awaiting collection of the 2010 post-deployment samples from Europe. This sampling has been delayed for crewmember logistical reasons.</p> <p>A data update for this study was presented at the 2011 NASA Investigators Workshop:</p> <p>B. E. Crucian, M. Feurecker, AP. Salam, A. Rybka, R.P. Stowe, M. Morrels, S. K. Mehta, H. Quiarte, Roel Quintens, U. Thieme, I.Kaufmann, D. S. Baatout, D.L. Pierson, C. F. Sams and A. Choukèr. The ESA-NASA ‘CHOICE’ Study: Winterover at Concordia Station, Interior Antarctica, as an Analog for Spaceflight-Associated Immune Dysregulation. 18th IAA Humans in Space Symposium. Houston, Texas, April 11-15, 2011.</p>
Bibliography Type:	Description: (Last Updated: 06/29/2023)
Abstracts for Journals and Proceedings	<p>Crucian BE, Feurecker M, Salam AP, Rybka A, Stowe RP, Morrels M, Mehta SK, Quiarte H, Quintens R, Thieme U, Kaufmann I, Baatout DS, Pierson DL, Sams CF, Choukèr A. "The ESA-NASA ‘CHOICE’ Study: Winterover at Concordia Station, Interior Antarctica, as an Analog for Spaceflight-Associated Immune Dysregulation." 18th IAA Humans in Space Symposium, Houston, Texas, April 11-15, 2011.</p> <p>18th IAA Humans in Space Symposium, Houston, Texas, April 11-15, 2011. , Apr-2011</p>