2013 Behavioral Health and Performance Standing Review Panel Status Review

Statement of Task for:

The Risk of Adverse Behavioral Conditions and Psychiatric Disorders,
The Risk of Performance Decrements Due to Inadequate Cooperation, Coordination, Communication, and Psychosocial Adaptation within a Team, and
The Risk of Performance Errors Due to Fatigue Resulting from Sleep Loss, Circadian Desynchronization, Extended Wakefulness, and Work Overload

Comments to the Human Research Program, Chief Scientist

2013 Behavioral Health and Performance (BHP) Standing Review Panel (SRP) Status Review WebEx/teleconference participants:

SRP Members:
Gloria Leon, Ph.D. (chair) – University of Minnesota
Thomas Balkin, Ph.D. – Walter Reed Army Institute of Research
John Caldwell, Ph.D. – Clockwork Research, Ltd.
Joel Dimsdale, M.D. – University of California, San Diego (Emeritus)
Thomas Joiner, Ph.D. – Florida State University
Martin Paulus, Ph.D. – University of California, San Diego
Stephen Zaccaro, Ph.D. – George Mason University

National Space Biomedical Research Institute (NSBRI):
Jeff Chancellor, Ph.D.

NASA Johnson Space Center (JSC):
Diana Arias
Gary Bevin, M.D.
Laura Bollweg
Craig Kundrot, Ph.D.
Lauren Leveton, Ph.D.
Kristine Ohnesorge
Holly Patterson
Michele Perchonok, Ph.D.
Cedric Senter, M.D.
Mark Shelhamer, Sc.D.
Susan Steinberg, Ph.D.
Brandon Vessey, Ph.D.
Alexandra Whitmire, Ph.D.

NASA Headquarters (HQ):
Bruce Hather, Ph.D.
Stephen Davison, Ph.D.
Victor Schneider, M.D.

NASA Research and Education Support Services (NRESS):
Tiffin Ross-Shepard

On December 2, 2013, the BHP SRP, participants from the JSC, HQ, and NRESS participated in a WebEx/teleconference. The purpose of the call (as stated in the Statement of Task) was to allow the SRP members to:

1. Receive an update by the HRP Chief Scientist or Deputy Chief Scientist on the status of NASA's current and future exploration plans and the impact these will have on the HRP.
2. Receive an update on any changes within the HRP since the 2012 SRP meeting.
3. Receive an update by the Element or Project Scientist(s) on progress since the 2012 SRP meeting.
4. Participate in a discussion with the HRP Chief Scientist, Deputy Chief Scientist, and the Element regarding possible topics to be addressed at the next SRP meeting.

Based on the presentations and the discussion during the WebEx/teleconference, the SRP would like to relay the following information to Dr. Shelhamer, the HRP Chief Scientist.

1. The SRP thinks that the briefings were very well done and just the right length for a two hour WebEx/teleconference.

2. The SRP thinks that the BHP Element is on a very good trajectory and there are a number of new studies funded that seem quite promising. There is also appropriate attention to enhancing positive experiences that include the vehicle environment.

3. The SRP thinks that the new Human Exploration Research Analog (HERA) is a major step forward and will be very beneficial specifically to the BHP risks.

4. The SRP recommends that the International Space Station Medical Projects (ISSMP) Office work with its international partners to develop a single protocol to be used for both the US and Russian astronaut/cosmonaut during the one-year mission.

5. The SRP thinks that it is very important to be able to access the Human Performance Database to obtain relevant selection data as well as any information on behavioral conditions that might develop over time to inform about the possible prediction of the later development of some type of behavioral health problem or more serious psychopathology. This has been a longstanding issue, and the SRP thinks that along with selection information as predictors, performance data as outcome variables are also highly relevant.

6. There is emerging evidence that cognition is actually not a good predictor of resilience and the SRP was wondering whether other domains are being explored.

7. The SRP thinks that the investigators concerned with sleep difficulties in space should consider the literature on the effects of posture on sleep. This is important because the literature suggests that greater alertness is observed in a more upright posture due to physiological changes associated with changes in baroreceptor firing rates and other neurophysiological effects which would likely be indefinitely affected by gravitational factors (or the lack of gravitational factors). When considering whether or not people in space eventually adapt to sleeping in microgravity, it might be interesting to do a small study on Earth to determine whether people eventually sleep well while tilted in an upright position despite the initial disturbances noted. Perhaps there are other manipulations that could

experimentally investigate this issue. At any rate, the SRP thinks this issue should be considered along with more obvious environmental factors such as carbon dioxide levels, light, temperature, etc.

8. The SRP is wondering if there has been any internal discussion as to why the sleep duration went in the opposite direction in the analog environment relative to the International Space Station (ISS) results.

9. The SRP thinks that, in presenting information, as a first step, an attempt should be made to precisely or operationally define those common, but ambiguous terms that are omnipresent in the presentations and on the website, and are critical to understanding the research efforts and findings. For example "fatigue" (sometimes incorrectly used as a synonym for "sleepiness"), "stress" (the definition always ends up being circular), "resilience" (absence of pathology?), and "workload" (is this a purely objective concept, or is it "in the eye of the beholder/worker"?) Although the SRP has a general idea of what is meant by these words, greater specificity would be helpful.

10. The SRP would like to know if a set of criteria has been established detailing when to move a study from an analog environment to a space environment?