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**2012 Immune Risk Standing Review Panel**  
**Status Review for:**  
*The Risk of Crew Adverse Health Event Due to Altered Immune Response*  
**Comments to the Human Research Program, Chief Scientist**

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2012 Immune Risk Status Standing Review Panel (SRP) WebEx/teleconference Participants:

**SRP Members:**

Gailen Marshall, M.D., Ph.D. – University of Mississippi Medical Center (Chair)

Nancy Klimas, M.D. – University of Miami School of Medicine

Janet Nicholson, Ph.D. – Center for Disease Control

Pablo Okhuysen, M.D. – University of Texas Medical School at Houston

**NASA Johnson Space Center (JSC):**

David Baumann

Brian Crucian, Ph.D.

Craig Kundrot, Ph.D.

Peter Norsk, M.D.

LaRona Smith, Ph.D.

Clarence Sams, Ph.D.

Susan Steinberg, Ph.D.

**NASA Headquarters (HQ):**

Bruce Hather, Ph.D.

**NASA Research and Education Support Services (NRESS):**

Tiffin Ross-Shepard

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On December 4, 2012, the Immune Risk SRP, participants from 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 (for example, each of the Elements rewriting their gaps) since the 2011 SRP meeting.
3. Receive an update by the Element or Project Scientist(s) on progress since the 2011 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. Kundrot, the HRP Chief Scientist (Acting).

1. The SRP was impressed with the work that has been done and the data gathered thus far by the immune discipline. The SRP also thinks that the future work planned looks promising, as well.
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2. The SRP found the cytokine work particularly interesting; however, the SRP thinks it is important to determine what the effects of changes in cytokines and cytokine responses mean for the overall health of the astronaut.
  3. The SRP thinks that the work in progress on characterizing the immune defects that are possibly associated with chronic virus activation are very impressive considering the limitations that human research in the space program entails.
  4. The SRP thinks that significant progress has been made in the characterization of space travel associated changes in the immune system that may explain concomitant latent virus activation. Although these changes appeared to be short lived and reversible upon return to Earth, the characterization of immune function that is planned for future and longer missions will be of great importance. The combination a quantitative drop in immune cells that is concomitant with latent Epstein-Barr virus (EBV) activation is of great interest and may have significant health implications in long term travel. Understanding the relative contributions of stress, circadian cycles, cosmic radiation and microgravity have on quantitative and qualitative immune parameters are very relevant.
  5. There are no currently effective measures to treat EBV infection and the value of treating latent EBV infection is unknown. The reactivation and subsequent control of EBV infection in space travelers provides a unique opportunity to delve into the immune molecular mechanisms responsible for viral control of this chronic infection. Elucidating these mechanisms will not only provide an option for countermeasure in space travelers but would be a breakthrough that could translate into novel treatments for lymphoma or post-transplant lymphoproliferative disease. This could be an opportunity for inter-agency funding since it would be relevant to large populations of patients.
  6. The characterization of saliva biomarkers is a novel approach, particularly since it is a more practical way of obtaining markers of immune parameters in space travelers. The SRP thinks it will be important though to correlate observations with more traditional assays and additional ground based work could focus on further validating immune function assays in saliva.
  7. In future SRP meetings, the SRP thinks it would be of interest to know the clinical characteristics of the skin conditions and the current thought of reasons for rashes. While crowded, humid conditions will favor dermatophytes, these infections could partially be explained by immune dysfunction. The SRP also thinks it would be of interest to know if immune response to common dermatophytes are altered in space travelers. It is believed that some of the rashes are responsive to steroids and it would be of interest to know the types of immune cells that are associated with skin lesions. Perhaps a skin biopsy at the time of landing could be studied for lymphocyte infiltration and cells characterized by immunohistochemistry.