"Martian Dust Toxicity: Should We Believe the Headlines?". J. Torin McCoy[1] ,Valerie E. Ryder[1], Chiu-Wing Lam[2], Robert R. Scully[2], and Amy A. Romoser[2, 1], NASA Johnson Space Center, Biomedical Research and Environmental Sciences Division, 2101 NASA Parkway, Houston Texas 77058, [2] Wyle-KBR, Biomedical Research and Environmental Sciences Division, 2101 NASA Parkway, Houston, Texas 77058

Introduction: There are a number of intriguing technical challenges and risks association with Martian exploration, and the topic of Martian dust has garnered significant attention from both the scientific community and the popular media. This attention is likely justified when considering (1) the experience of NASA with Apollo, where lunar dust infiltration posed a serious challenge to both human health and operations, (2) observations about the unique challenges of a Martian atmosphere, dust storming, and other planetary surface phenomenon, and (3) geological data from Martian robotic missions that have confirmed the presence of notable levels of certain chemical components (e.g., chromium, perchlorate). However, a case can be made that this attention has resulted in some expected sensationalization and inflated perception of the actual risk posed by the Martian dust, at least with respect to human health.

This presentation will highlight the state of knowledge in regard to Martian dust exposure and toxicity. While Martian dust undoubtedly poses some new scientific challenges, NASA already has a decent foundation to build on in assessing related crew health risks. With the culmination of the Lunar Airborne Dust Toxicity Assessment Group (LADTAG) efforts, a permissible exposure limit (PEL) was established for lunar dust in 2014, and later translated into a NASA Standard 3001 Volume 2 standard. While this PEL is intended to be specific to lunar exposures, the presentation will demonstrate that there are tangible ways to relate this PEL to Martian exposures, especially in the context of evaluating exposures to chemicals carried within the Martian regolith. The Lunar PEL will be discussed in context, to allow the audience to understand what type of toxicity considerations are made in determining a PEL. Efforts will be made to contrast earth-based assumptions in risk assessment that are poorly relevant to spaceflight, and may lead to misleading conclusions if not recognized. A screeining-level spaceflight risk assessment will be presented for several potentially relevant elements/compounds within the dust on Mars (e.g., chromium, perchlorate). Exposure potential and special considerations associated with spaceflight toxicity will be explored in detail for these stressors.

The presentation will conclude by touching on some of the research gaps and opportunities to further our understanding of Martian dust toxicity that will hopefully prove useful to the scientific community.