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HUMAN HEALTH AND PERFORMANCE PREPARATIONS FOR A ONE-YEAR MISSION ON THE ISS.

Abstract

The Human Health and Performance Directorate (HHP) at the NASA Johnson Space Center began a review in 2012 of a proposed mission for a one-year duration for two crewmembers (one crewmember from the United States and one from Russia). The HHP first determined that all 48 human system risks for long duration space flight would need to be reviewed. This review identified that two risks were most important for long-duration crew assignment, radiation and the emerging Visual Impairment Intracranial Pressure (VIIP) risk. The current radiation risk model was updated to a 2012 version that took into account all of the most recent recommendations from external advisory groups. This updated model resulted in a slight improvement in the confidence interval around the standard adding some flexibility for long duration crew assignments. Further, some initial screening criteria were set for VIIP that considered the most serious changes in vision and clinical findings to date. Using these criteria, US crewmembers were screened and a long-duration crewmember was assigned in the fall of 2012 (Scott Kelly). The remaining 46 risks were considered for their impact to flight operations, training and logistics and will be further described in detail. Special consideration was given to exercise protocols to maintain bone and muscle health, changes to behavioral health care in-flight and preflight training, and additional up and down mass required to maintain clinical and environmental care capabilities and to obtain needed samples from various experiments (down mass requirements). Environmental health care risks of importance included air and water quality monitoring both in-flight and for required samples to be returned for analysis. Crew food provisioning is being reviewed for maintaining adequate variety and nutritional value for the one-year mission. Finally, additional considerations for post-flight rehabilitation will be developed. The complete review of the 48 human systems risks and the resulting preparations for the one-year mission will be described in detail in the paper.