Appendix II

General Statement on Longitudinal Surveillance of Astronaut Health

XXXI Planetary Congress
Minsk, Belarus
September 14, 2018

Nearly 70 years ago, the US and Soviet space programs initiated research on humans in space in order to determine whether or not space exploration was feasible. Incrementally, both nations extended the survival time in low earth orbit. Both short term and longer terms physiological effects were found. The short term effects included vestibular disturbances and shifts in the body fluids. As the length of low earth orbit stays were extended on Skylab, microgravity effects on bone density and muscle strength were also observed. Bioastronautics research continued on the Space Shuttle, Salyut, and Mir and today continues on the International Space Station. As we extend the flight durations nearer to Mars duration, we continue to learn more about the effects of the space environment on the human body, and to develop countermeasures where we understand both cause and effect.

Astronauts and Cosmonauts, while they are actively flying, are cared for by flight surgeons, and medical data continuously collected by human physiology researchers. However, the longer term effects on health, after astronauts/cosmonauts retire and leave their agencies, is not fully understood. As a result, NASA implemented the Longitudinal Surveillance of Astronaut Health (LSAH) program to annually collect health data during a physical at the NASA Johnson Space Center. This program was also extended to Canadian astronauts. Similar post retirement programs do not appear to be universally implemented by nations with flown astronauts and cosmonauts.

Of particular interest is the long term effect of the space radiation environment on human physiology. This includes Galactic Cosmic Rays (GCRs) which are pervasive throughout our galaxy, but rarely reach the surface of the earth, and so are difficult to replicate in Earth based test facilities. Exposure to GCRs and Solar Particle Events are carried as one of the highest risks to deep space missions for humans, but the exposure effects might not be observed for decades. Obtaining and understanding the long term effects of the space environment on retired astronauts/cosmonauts is critical to protecting the future crewmembers who will participate in future exploration missions, and could be critical to mission success.

Understanding the effects on health and developing countermeasures also requires a deep understanding of both the symptom as well as the cause. Statistically significant conclusions can only be calculated accurately with a sufficient number of astronaut/cosmonaut subjects. Unfortunately, the researchers do not have enough data from retired astronauts/cosmonauts to reliably determine these long term effects. There are three primary reasons for this: (1) while longitudinal data may be collected from US and Canadian astronauts and collected into a common data base, this does not include astronauts or cosmonauts from other nations, (This data excludes information from ESA, JAXA, and RSA) (2) although data may be collected during annual physicals, “end of life” data is generally not available so not all health data is included, and (3) with longer stays on ISS and fewer flyers on an annual bases, the US/Canadian sample size population, as well as for all nations on ISS, is decreasing. In a best case scenario, the NASA data base or the Russian data base might each collect long duration data on 4

crewmembers/year, involving research with a number of complex variables, such as age, ethnicity, and gender. These complex combinations of variables will require much larger population sizes to accurately evaluate.

Therefore, today at the 31st Planetary Congress of the Association of Space Explorers (ASE), the membership, representing astronauts and cosmonauts from 37 nations, unanimously approved the following sense of the organization regarding the collection and analyses of human physiological data important to space exploration: to safely leaving Low Earth Orbit (ELO) or to extending LEO mission duration.

(1) In order to mitigate health and mission success risks to future space explorers, especially with the Mars destination, the international ISS multilateral control boards involved in collecting astronaut health data during flight careers should consider how to implement a common data base for both career and post career data, including end of life data, at the discretion of the astronaut or cosmonaut. It is expected that an international process for selecting peer reviewed proposals for evaluating this data would also be developed.

(2) The ASE recognizes that post retirement participation by astronauts and cosmonauts is voluntary, and that applicable approvals and permissions may be nation dependent. Therefore, ASE requests that the appropriate ISS multilateral control boards develop an international process which relieves these administrative burdens from the flyers and facilitates exchange of data, with flyer release, directly between the attending physicians and the agency or groups responsible for assembling the information into a standard searchable data base.