SPACE LIFE SCIENCES SYMPOSIUM (A1)
Medical Care for Humans in Space (3)

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DEVELOPMENT OF AN ADVANCED MEDICAL SYSTEM IN SUPPORT OF A FUTURE MANNED LUNAR MINING PROGRAM

Abstract

Medical support of astronauts has been of paramount importance to space programs ever since the dawn of human spaceflight. With an eye towards long duration missions beyond low earth orbit, including extended missions on the moon, there is a growing need to develop more sophisticated medical facilities and protocols capable of providing advanced onsite medical care for astronauts. Shackelton Energy Company (SEC) intends to establish advanced mining facilities on the moon to extract water from polar ice and convert it into liquid hydrogen and oxygen fuel. This will be delivered to orbital fuel depots to refuel spacecraft in earth orbit. Although the mining process will be largely automated, a team of astronauts will be deployed to the lunar surface to oversee and maintain the mining operation. This will require a sophisticated medical system capable of providing advanced medical care in such an isolated and remote location.

The current body of medical literature was reviewed regarding issues related to providing medical care for astronauts on long duration space missions. A systematic approach was used to identify the needs of a medical system that would care for a corps of astronauts that will spend 6 months or more at a time on the lunar surface with little to no opportunity for immediate return to earth.

A comprehensive medical care system will be necessary to adequately tend to the health and safety of astronauts who plan to spend an extended period of time on the lunar surface. This system must oversee astronaut pre-flight medical evaluations, screening, selection, and health optimization. During the missions themselves there will be a need for advanced but efficient medical and surgical capabilities on the lunar surface, with or without earth-based telemedical support. On-going countermeasures and health maintenance programs will also be necessary. Finally, there must be a rigorous program for post-flight medical evaluations and physiologic recovery.

Long duration human presence on the lunar surface is inevitable, thus necessitating advances in medical support capabilities. Efforts such as those taken by SEC will further push the frontier of medical and surgical capabilities in space.