Medical Countermeasures and Technologies for a Successful Mission to Mars

Sherry Curtis APUS Student

A mission to Mars faces significant medical risks and technological challenges. The two major medical risks are from space radiation and long-term exposure to microgravity. Radiation exposure poses acute and chronic health risks, including increased cancer risk and damage to critical biological systems. Extended time in a microgravity environment leads to fluid redistribution, ophthalmological changes, muscle atrophy, cardiovascular deconditioning, and bone density loss. Extended stays on the surface of Mars require the use of ISRU technologies for oxygen production using Martian CO_2, 3D printing using local materials, and intercropping for fresh food production.

This poster presentation will discuss some of the medical countermeasures and technologies needed for a successful mission to Mars. Shielding materials like moistened towels and a water-filled garment have been used on the ISS to reduce radiation doses and could also be used on a mission to Mars. A Short Arm Human Centrifuge has been developed to simulate gravity and can help maintain physiological health in the microgravity environment. The Mars Oxygen ISRU Experiment (MOXIE) has been successful in producing oxygen from the CO_2 in the Martian atmosphere and could be used to produce oxygen for rocket fuel and life support systems. The Martian regolith has basalt which can be used for 3D printing material to construct habitats and print necessary tools and equipment. Intercropping in Mars regolith had mixed effects on plant performance, but improvements to the regolith, such as the addition of compost, could enhance conditions for successful intercropping.