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Challenges of Life Support/Medical Support for Human Missions (8)
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AN INTERNATIONAL SPACE STATION (ISS) TECHNOLOGY DEMONSTRATION EXPERIMENT TO ADDRESS MEDICAL SUPPORT CHALLENGES WITH ASTRONAUT EYE MONITORING

Abstract

Long duration human missions create medical support challenges for the eye changes, collectively called Spaceflight Associated Neuro-ocular Syndrome (SANS), which affect nearly two-thirds of long-term mission astronauts. Medical monitoring of ophthalmological changes is currently done aboard the International Space Station (ISS) using heavy instruments with large power and data downlink requirements that are built for clinical use on Earth, and not field use in the isolated, confined, and extreme (ICE) conditions characteristic of space. To mitigate these issues, space agencies are seeking ways to improve (1) space-based medical data collection systems, and (2) monitoring of astronaut physiological parameters in a minimally invasive manner. To meet these challenges, described herein is a collaborative German Aerospace Center (DLR), European Astronaut Centre (EAC) technology demonstration experiment, planned for late 2021 to early 2022 aboard ISS, to integrate a commercially available, clinically approved 10 g ophthalmology device with onboard ISS crew iPads and the EveryWear physiology and medical monitoring app. It is planned to collect retinal images for SANS monitoring using existing ISS hardware (crew iPads), and to downlink data using existing EveryWear encryption. A parallel ground study, using analog astronaut control subjects on the Austrian Space Forum (OeWF) AMADEE Mission, is planned to test the same technology in an ICE Mars analog environment. The planned experiment would enable human-in-the-loop (HITL) testing as the final step in Technology Readiness Level (TRL) advancement. If successful, this technology demonstration will provide task load index, speed, and feasibility data, to determine whether or not any size, weight, integration, crew time, and cost savings would be feasible for long-term use in space during future ISS, Artemis program, and Mars missions.