

Life support Challenges for Human Space Exploration (10)
Supporting Crews for Exploration Missions (2)

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RISKS ASSOCIATED WITH ONSET OF GLAUCOMA AND NECESSARY OCULAR TESTS FOR
LONG-TERM SPACE MISSIONS

Abstract

Glaucoma is the second leading eye condition that results in blindness if it is not treated in time. Because this condition can progress very quickly, often without symptoms, and cause permanent damage to the optic nerves, the earlier it is detected, the higher is the likelihood of preventing blindness. A research project on the relevance and importance of Glaucoma and other ocular tests for long-term space missions was conducted as part of International Space University (ISU)'s Space Studies Program (SSP) in summer 2011. First, data related to Glaucoma in patients on Earth was researched, including types, causes/risk factors, symptoms, treatments, and global statistics. Second, ocular changes, for instance regarding fluid production and structure of the eye, that occur in the space environment (as for example due to microgravity), were investigated, along with their impact on risk factors for Glaucoma. Third, research was conducted on history of ocular tests for human space missions, as well as what visual and ocular tests are currently performed on astronauts. The latter included data from the Canadian astronaut selection process, as well as current pre-flight, in-flight, and post-flight ocular tests and assessments (both type and frequency) as part of ISS standard testing and agency-specific testing. A series of results were drawn from the research and analysis, including whether or not current ocular testing on astronauts is adequate for long-term space missions. This project demonstrated the relevance of glaucoma and other ocular conditions for human space missions, particularly those of long-term missions, as for example outpost on the Moon or trip to Mars. It also provided recommendations including further research and future considerations, including in the astronaut selection process, diagnostic testing in space, and treatment options for long-term missions.