

SPACE LIFE SCIENCES SYMPOSIUM (A1)
Human Physiology in Space (2)

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ARTIFICIAL GRAVITY WITH ERGOMETRIC EXERCISE ON INTERNATIONAL SPACE STATION
AS THE COUNTERMEASURE FOR SPACEFLIGHT DECONDITIONING IN HUMANS.

Abstract

To prevent and counteract the spaceflight deconditioning, including deconditionings of cardiovascular, bone metabolism, musculoskeletal, immune, thermoregulatory, and autonomic nervous systems in humans, we propose to construct a facility consisting of a short arm centrifuge incorporating ergometric exercise. In ground-based artificial gravity studies, we have shown that the daily protocol of G-force and stepping exercise, increasing over 30 minutes, is effective in preventing and counteracting the deconditioning accompanying 20 days of bedrest. Subjects will be the crew members of International Space Station, and before, during, and after the 3 months of microgravity exposure, effectiveness of artificial gravity with ergometric exercise will be evaluated. The artificial gravity load will be at least 1.4 G for cumulative 30 min daily, and ergometric exercise load will be 60W at first. The step-up level will be 0.2G and 15W respectively if the subject can endure for 5 min. In this project, we will determine the effectiveness of use of the facility in actual microgravity on International Space Station by using our facility and protocol for periods of 3 months or longer, and the alterations of each system will be evaluated by international cooperative team. The results will be useful in considering the countermeasure for spaceflight deconditioning during exposures of long duration as expected for a Mars exploration flight.