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EFFECT OF ARTIFICIAL GRAVITY WITH EXERCISE ON SPACEFLIGHT DECONDITIONING IN HUMANS, AND PROJECT FOR ASSESSMENT OF ARTIFICIAL GRAVITY IN H-II TRANSFER VEHICLE IN INTERNATIONAL SPACE STATION. SATOSHI IWASE, NAOKI NISHIMURA, KUNIIHIKO TANAKA,

Abstract

In order to examine the effectiveness of artificial gravity with exercise on the spaceflight deconditioning in humans, we tested a newly developed and fabricated short radius centrifuge device on spaceflight deconditioning induced by simulated microgravity using short term of 6 head-down bedrest of 7 days. The experimental position during centrifuge was lying down position with their legs up. The diameter of the device was 2.8 m, the loaded G was 1.4 G at the heart level, and the intermittent G load was 30 min per day. Fluid shift was compared using bio-impedance. Before and after the bedrest, the anti-G score was calculated as the sum of [the loaded G] [endured time in second], and the countermeasure group exhibited significant higher score compared with the control. Myatrophy and bone metabolism showed no significant difference. In conclusion, artificial gravity induced by short radius centrifuge was effective in improving the orthostatic tolerance but bed rest for only one week was too short to elicit the difference in muscular and bone metabolism. In 2017, a novel artificial gravity project was proposed. A centrifuge device with exercise is to be installed in the H-II Transfer Vehicle (Kohnotori) attached to the International Space Station. This device will validate the effectiveness of artificial gravity under actual weightlessness in space.