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BODY FLUID DISTRIBUTION DURING ARTIFICIAL GRAVITY AS A COUNTERMEASURE AGAINST SPACE FLIGHT DECONDITIONING USING A SEGMENTAL BIOELECTRICAL IMPEDANCE ANALYSIS

Abstract

Long term spaceflight increases the risks of spaceflight deconditioning including cardiovascular deconditioning such as orthostatic intolerance. The causes of spaceflight deconditioning has not been clarified, however, it appears to be mainly caused by cephard fluid shift. Therefore, body fluid shift to the lower body and legs by short radius centrifuge device inducing artificial gravity has been employed for countermeasures to ameliorate the spaceflight deconditioning. In order to quantitate the body fluid distribution change during artificial gravity we employed bioelectrical impedance analysis (BIA). We measured the body fluid distribution during artificial gravity of 1.0G at the heart level for 10 min using a BIA. The body fluids of the chest and upper arm area decreased transiently after the onset of centrifuge and remained low throughout the centrifuge period of 10 min. On the other hand, the body fluids of the abdomen area increased transiently after the onset of centrifuge and remained throughout the centrifuge period. The body fluid of the thigh area gradually increased during centrifuge period. Body fluid distribution after artificial gravity quickly returned to the initial level. We were able to confirm the fluids shift during artificial gravity using segmental BIA and provide more information on the indices of orthostatic intolerance after spaceflight, but the body fluid distribution of the Intracellular and extracellular fluid is a future challenge.