

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

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INCREASED CEREBROSPINAL FLUID VOLUME AFTER LONG-DURATION SPACEFLIGHT

Abstract

In the current study, we assessed the impact of long-duration spaceflight on brain and ventricular volumes and on the shape of the eyeballs in a cohort of 8 long-duration cosmonauts and 13 age- and gender matched controls. 3T brain MRI's were performed using a 3D T1-weighted FSPGR pulse sequence. Data processing was done using FSL's SIENA and SIENAX software, as well as implementing FreeSurfer. In addition, a normalized measure of sphericity of the eyeballs was calculated. Each cosmonaut was scanned before launch to space and after re-entry back on Earth. The controls were also scanned twice, with a similar time interval, on the same scanner. After long-duration spaceflight, there was a significant increase in ventricular volume in the cosmonauts in comparison to the controls ($p = 0.0003$) No significant difference in the percentage of brain volume change between the cosmonauts and the controls was found. However, a significant decrease in peripheral grey matter volume after long-duration was found, in comparison to healthy controls ($p = 0.004$). In addition, a significant increase in the lateral ventricles (left: $p < 0.0001$, right; $p < 0.001$) and left choroid plexus ($p < 0.05$) was found for the cosmonauts when compared to the controls. 50