

Salivary varicella zoster virus in astronauts and in patients of herpes zoster

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Spaceflight is a uniquely stressful environment with astronauts experiencing a variety of stressors including: isolation and confinement, psychosocial, noise, sleep deprivation, anxiety, variable gravitational forces, and increased radiation. These stressors are manifested through the HPA and SAM axes resulting in increased stress hormones. Diminished T-lymphocyte functions lead to reactivation of latent herpesviruses in astronauts during spaceflight. Herpes simplex virus reactivated with symptoms during spaceflight whereas Epstein-Barr virus (EBV), cytomegalovirus (CMV), and varicella zoster virus (VZV) reactivate and are shed without symptoms. EBV and VZV are shed in saliva and CMV in the urine. The levels of EBV shed in astronauts increased 10-fold during the flight; CMV and VZV are not typically shed in low stressed individuals, but both were shed in astronauts during spaceflight. All herpesviruses were detected by polymerase chain reaction (PCR) assay. Culturing revealed that VZV shed in saliva was infectious virus. The PCR technology was extended to test saliva of 54 shingles patients. All shingles patients shed VZV in their saliva, and the levels followed the course of the disease. Viremia was also found to be common during shingles. The technology may be used before zoster lesions appear allowing for prevention of disease. The technology may be used for rapid detection of VZV in doctors' offices. These studies demonstrated the value of applying technologies designed for astronauts to people on Earth.