

SPACE LIFE SCIENCES SYMPOSIUM (A1)
Behaviour, Performance and Psychosocial Issues in Space (1)

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SPACE DEMENTIA: A HEALTH RISK FOR CREW MEMBERS ON LONG DURATION SPACE
MISSIONS?

Abstract

Human neurocognitive performance is impaired during both short- and long-duration space missions. Microgravity-induced detriments to cognitive functions are currently thought to be attributable to psychological rather than due to primary physiological effects. However, research indicates abnormal gravity induces altered gene expression, cellular apoptosis and abnormal neurotransmitter concentrations in the hippocampus. Also, protein kinase C isoforms that are central to learning and memory in humans are gravi-sensitive. These results suggest neurodegenerative disease in space, and the associated memory loss, represent a health and performance risk for astronauts. Russian flight surgeons observed neurological dysfunction in the crew members on long duration space missions. Characteristics of psychic asthenization are early symptoms of dementia on Earth; that is, memory dysfunction, poor attention and concentration, irritability, emotional lability and fatigue. None of the current in-flight onboard neuropsychological tests used by NASA during the six-month ISS increments (e.g. Win SCAT) investigate detriments in long-term memory. If neurocognitive dysfunction is left undetected and unmitigated then critical operational errors will occur that threaten mission objectives. Space dementia therefore has serious consequences for the feasibility of long-term habitation in a microgravity environment. This paper will assess the level of countermeasure readiness relating to microgravity-induced memory loss and assess whether the development of appropriate countermeasures is critical for crew members on future long duration explorer class space missions.