ACUTE AND LONG TERM OUTCOMES OF SIMULATED DEEP SPACE RADIATION EXPOSURE ON LATENT VIRAL CNS INFECTION AND CNS PATHOLOGY

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The successful diaspora of humans into deep space requires an understanding of the risk of deep space radiation exposure on short and long term health outcomes, including risks to the central nervous system (CNS). Assessing CNS risk must consider the impact of deep space radiation on the behavior of latent neurotropic infectious agents that reside within the human CNS. Herpes simplex virus (HSV) is among the most widespread agent in this category. Greater than 80% of the global human population above the age of 20 has been infected with herpes simplex virus (HSV). Infection by this virus includes the highly efficient invasion of the nervous system and the deposition of millions of viral genomes in 10's of 1,000's of neurons in the peripheral and central nervous systems. These genomes serve as a life-long reservoir from which the virus can exit this latent state, enter the viral lytic cycle and produce infectious virus. Latent HSV cannot be eliminated from the nervous system and there is no vaccine to prevent infection. Thus for the foreseeable future, humans traveling into deep space will harbor this and other alpha-herpes viruses. "Reactivated" virus is shed to the surface to infect new hosts. Of importance to this project, reactivation of latent HSV (the frequency of which is stress related) results in chronic inflammation in the peripheral nervous system, in the eye where it can cause herpetic stromal keratitis, and in the brain. The Indeed there is substantial evidence that in combination with genetic risk factors, HSV infection in the CNS further increases the probability of developing Alzheimer's disease. In this project, the effects of simulated deep space radiation on the development of CNS pathology (reactive lesions) and the impact of latent and induced in vivo reactivation of HSV infection on the development of CNS pathology will be determined. Funding for this project begins in January 2014 with beam time at BNL schedule for Spring 2014. The data presented will focus on the HSV model system and the experimental design of our upcoming studies.

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