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SPACE LIFE SCIENCES SYMPOSIUM (A1)
Radiation Fields, Effects and Risks in Human Space Missions (4)

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EFFECTS OF SPACEFLIGHT ON CANDIDA ALBICANS

Abstract

For a prolonged period astronauts are exposed to both ionizing radiation and microgravity. Few studies have been done on the individual effects of microgravity and radiation on yeast cells; no studies have been done in which fungi cells have been exposed to both microgravity and ionizing radiation simultaneously. Understanding the induced changes in the morphology and pathogenicity of microorganisms is important for the further success of long-term spaceflight. Candida albicans, a dimorphic fungus, has been found to alter itself from a non-virulent yeast cell to an infection causing filamentous fungi. This leads to our study of how Candida albicans responds to the exposure of spaceflight by exposing cells to low-shear model microgravity using a Slow Turning Lateral Vessels (STLV) to simulate microgravity over a lapsed period of time while under the simultaneous treatment of gamma radiation, the product of radioactive atoms. We are investigating the cell cycle, morphological changes, and resistance to antifungal drugs that may be caused by the stress of microgravity with the combination of ionizing radiation. A 103 cell concentration of Candida albicans was inoculated into 250 ml STLVs filled with Sabouraud Dextrose broth. Simulated microgravity (SMG-STLV) and control (1g-STLV) vessels were rotated either vertically with the vessel parallel or horizontally with the vessel perpendicular to the gravitational vector. STLVs were incubated at 30 C in an isolated gamma chamber where they received doses of 1/2, 1, 1 1/2, 2, 3, 4 Gy over a period of 96 hours. At various time intervals samples were harvested and data obtained determined, biomass and biofilm production, optical density, and cell viability. Using a fluorescence microscope images are taken from both Control and STLV to compare morphological changes; and re-plated to examine changes in latter growth. Data collected shows notable changes in cell cycle rate and hyphae formation. Although there was no significant difference in cell size, new daughter buds seems to form smaller in STLVs over generations to that of the control. We present preliminary data on the effects of simulated microgravity on morphology and cell growth of Candida albicans.