Challenges of Life Support - Medical Support for Manned Space Exploration (9)
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IMPACT OF SPACEFLIGHT AND LOW DOSE IONIZING RADIATION ON THE EXPRESSION OF HSP90 GENES IN ARABIDOPSIS

Abstract

Plants in space are constantly exposed to a unique complex environment primarily consisting of cosmic radiation and microgravity. Understanding the biological effects of space environment factors and adaptive responses in plants is necessary for cultivation of plant in space, where plants may play a central part of the bioregenerative life support system and provide psychological support for sustained human inhabitation. Over the past decades, numerous spaceflight experiment have been performed with plant seeds and seedlings. Many studies reported that the frequency of phenotypic variations were remarkably increased in plants after spaceflight. These increase was generally considered as the consequence of intensive genetic damages induced by cosmic radiation especially the high energy heavy ions. In this study ,we analyzed the expression levels of Hsp90 genes in Arabidopsis after exposing seeds to spaceflight and low dose ionizing radiations. The results shows that a sustaining disturbance in expression of Hsp90 genes was induced both in the spaceflight and the low dose ionizing radiation plants. Since the Hsp90 genes play an important role in phenotypic buffering against genetic variations as well as environment changes, and impairment of Hsp90 regulation could expose previously concealed genetic variations and produce extensive phenotypic changes, the results of this study suggest that the impact of low dose ionizing radiation during spaceflight on the regulation of Hsp90 genes and phenotypic buffering might be an alternative explanation for the spaceflight- induced phenotypic variations in plants.