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Radiation Fields, Effects and Risks in Human Space Missions (4)

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A NEW METHOD FOR ASSESSMENT OF MUTATION FREQUENCIES INDUCED DURING LONG
TERM MANNED SPACE FLIGHT

Abstract

Radiation-induced mutation is one of the major effects which would increase cancer risk of astronauts and genetic instability of biological components. In future long term manned space flight, it's important to estimate the risk of chronic exposure to space radiation and microgravity for astronaut health as well as the performances of onboard biological components, such as plants and microbes in the ecological life support system. A variety of organisms have been used in studies of the effects of space radiation on mutation frequencies under microgravity, including *E.coli*, *B. subtilis*, *S.cerevisiae*, fruit flies and human cells. Due to the limited space resource and difficulty of biological cultivation and analysis under microgravity, it is hard to obtain consistent results of mutation frequencies. Here we have adopted a recombination reporter transgenic *Arabidopsis* in order to study the induced recombination frequencies of plants exposed to radiation and simulated microgravity. The plant is carrying a recombination construct contain two overlapping parts of Gus gene interrupted by hygromycin resistance gene. Once homologous recombination occurred between two overlapping sequences, a complete, functional Gus gene would be created. After histochemical staining of plants, recombination events can be visualized and thus recombination frequencies can be quantified. The potential use of this reporting system in future flight experiment is discussed.