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Radiation Fields, Effects and Risks in Human Space Missions (5)

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IONIZING RADIATION-INDUCED EMT AND TRANSFORMATION IN A HUMAN BRONCHIAL
EPITHELIAL CELL LINE

Abstract

Purpose: Lung cancer is the largest potential cancer risk in astronauts, however, there are few adequate assessment system till now. The purpose of this research is to investigate the cellular and molecular processes involved in lung cancer genesis induced by ionizing radiation exposure. **Methods:** A nontumorigenic human bronchial epithelial cell NL20 was exposed to 2 Gy of X-rays or 1 Gy of carbon ions. The morphology was observed and the survival of the irradiated cells was determined by a clonogenic survival assay. The ability to form colonies in soft agar was used as a biomarker of radiation induced malignant transformation in vitro. The mRNA and protein expression levels of epithelial to mesenchymal transition (EMT) related genes were detected to study the cellular response to ionizing radiation by using qRT-PCR and immunofluorescence analysis, respectively. **Results:** NL20 cells exhibited a characteristic epithelial morphology while lost that and acquired mesenchymal traits after X-ray or carbon ion radiation exposure. Moreover, the mRNA and protein levels of E-cadherin were both reduced while Vimentin and β -Catenin were increased. Notably, the efficiency of carbon ions was higher than X-rays. NL20 cells at passage 40 post irradiation proliferated more quickly and the soft agar colony formation efficiency was elevated significantly. **Conclusions:** These results suggest that ionizing radiation promoted the development of EMT and neoplastic transformation in NL20 cells.