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Author: Dr. meng zhang
Dalian Maritime University, China

HEAVY-ION RADIATION INDUCED BYSTANDER EFFECT IN MICE

Abstract

Radiation-induced bystander effect is defined as the induction of damage in neighboring non-hit cells by signals released from directly-irradiated cells. Recently, Low dose of high LET radiation induced bystander effects in vivo have been reported more and more. It has been indicated that radiation induced bystander effect was localized not only in bystander tissues but also in distant organs. Genomic, epigenetic, metabolomics and proteomics play significant roles in regulating heavy-ion radiation stress responses in mice. To identify the molecular mechanism that underlies bystander effects of heavy-ion radiation, the male mice head were exposed to 2000mGy dose of 12C heavy-ion radiation and the distant organ liver was detected on 1h, 6h,12h and 24h after radiation, respectively. MSAP was used to monitor the level of polymorphic DNA methylation changes. The results show that heavy-ion irradiate mouse head can induce liver DNA methylation changes significantly. The percent of DNA methylation changes are time-dependent and highest at 6h after radiation. We also prove that the hypo-methylation changes on 1h and 6h after irradiation. But the expression level of DNA methyltransferase DNMT3a is not changed. UPLC/Synapt HDMS G2 was employed to detect the proteomics of bystander liver 1h after irradiation. 64 proteins are found significantly different between treatment and control group. GO process show that six of 64 which were unique in irradiation group are associated with apoptosis and DNA damage response. The results suggest that mice head exposed to heavy-ion radiation can induce damage and methylation pattern changed in distant organ liver. Moreover, our findings are important to understand the molecular mechanism of radiation induced bystander effects in vivo.