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Mitochondrial DNA depletion induces radioresistance of Hep2 human laryngeal cancer cells

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Objective: To establish the mitochondrial DNA (mtDNA) depleted cell line (ρ^0 cell) and to investigate the effects of mtDNA on radiosensitivity of tumor cells and the possible mechanisms.

Methods: Hep2 was cultured with medium containing ethidium bromide (EB) to get ρ^0 cells, and then PCR, confocal microscope, transmission electron microscopy and growth defect experiment were used to identify the cell model. Afterwards, the radiosensitivity of ρ^0 and Hep2 cells were examined by colony formation assay. After radiation, cell proliferation was detected by CCK8 kit, cell cycle and apoptosis were analyzed by flow cytometry, ATP was detected by kit and reactive oxygen species (ROS) content was evaluated by Dichloro-Fluorescein diacetate salt (DCFH-DA) staining method.

Results: ρ^0 cell model was successfully established, colony formation assay shows reduced sensitivity after mtDNA deletion ($P < 0.05$). ρ^0 cell proliferation rate, the number of mitochondria and ATP content were significantly lower than Hep2 cells. Percentage of apoptotic cells in the two groups had no significant difference, but both ρ^0 and Hep2 cells showed G2 arrest and ρ^0 cell G2 arrest time was significantly longer ($P < 0.01$). ROS after irradiation, radiation detection display ρ^0 , Hep2 cells in both groups appeared ROS levels were elevated, but ρ^0 cells elevated ROS levels were significantly lower than Hep2 cells ($P < 0.01$).

Conclusions: Hep2 ρ^0 cell's radiosensitivity was significantly lower than Hep2 cells, which may be primarily associated with mitochondrial number decline, ATP, ROS production decreased and G2 arrest prolongation.

Biography

Hui Xu is a MD candidate in the second year in Zhongnan Hospital of Wuhan University. She is recipient of "National scholarship" (supported by Ministry of Education), four times. She is a student of Hubei Key Laboratory of Tumor Biological Behaviors & Hubei Cancer Clinical Study Center. Now she is doing research in State Key Laboratory of Proteomics, Beijing Proteome Research Center. She has published 5 papers in reputed journals.

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