Function and regulation of ATF3 expression induced by ionizing radiation

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Abstract

Ionizing radiation results in a series of damages of mammalian cells as a genotoxic stress. There are some genes expressed after cells damaged, in which ATF3, a member of ATF/CREB family of transcription factors, is one of them. In this report, we demonstrate that ATF3 can be induced by ionizing radiation. The induction of ATF3 protein requires normal status of p53 function in cells. There are some quantitive relationships between ATF3 induction and dosages of radiation or time post-irradiation. In another word, ATF3 expression induced by ionizing radiation present dose- and time-dependent. The regulation of ATF3 expression refers to program of promoter and transcription. Radiation induces ATF3 expression by activating the promoter and RNA transcription. In method of tetracycline-inducible system(tet-off), we have found that over-expression of ATF3 protein brings caspase/PARP proteins into cleavaged, which induces cell programmed death, and suppresses cell growth. Meanwhile, it was found that ATF3 expression could slow down progression of cell from G1 to S phase. It indicates ATF3 protein might play a negativ role in the control of cell cycle progression. It is very excited that expression of ATF3 protein did not only suppress cell growth, but also demonstrated protecting effect of cell growth suppression resulting from ionizing radiation. It is suggested that ATF3 protein might take part in the damage repair process of cells.

KEYWORDS: Function, ATF3, stress induction

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