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PUMA gene transfection can enhance the sensitivity of epirubicin-induced apoptosis of MCF-7 breast cancer cells

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ABSTRACT. We explored whether p53 upregulated modulator of apoptosis (*PUMA*) gene transfection could enhance the sensitivity of epirubicin-induced apoptosis of MCF-7 breast cancer cells. The liposome-mediated recombinant eukaryotic expression vector PUMA-pCDNA3 and empty vector plasmid were stably transfected into MCF-7 cells. Epirubicin (0.01-100 μM) was applied to MCF-7, MCF-7/PUMA, and MCF-7/pCDNA3 cells for 72 h. The MTT assay was used to calculate the cell survival rate in each group, and the 50% inhibitory concentration (IC50) was calculated. The IC50 values of epirubicin in MCF-7, MCF-7/PUMA, and MCF-7/pCDNA3 cells were 13 ± 1.4, 1.8 ± 0.2, and 10.7 ± 1.3 μM, respectively. The sensitivity of MCF-7/PUMA cells to epirubicin increased 7.2-fold. Epirubicin induced apoptosis in MCF-7 cells dose-dependently, but MCF-7/PUMA cell-induced apoptosis was more significant compared to controls. Low

concentrations of epirubicin (0.1 μM) caused low levels of apoptosis of MCF-7/pCDNA3 (1.15 ± 0.26%) and MCF-7 cells (0.9 ± 0.24%), but significantly induced apoptosis of MCF-7/PUMA cells (6.44 ± 1.46%). High epirubicin concentration (1 μM) induced apoptosis in each group, but the epirubicin MCF-7/PUMA apoptosis rate (35.47 ± 9.36%) was significantly higher than that of MCF-7 (12.6 ± 3.73%) and MCF-7/pCDNA3 (15.2 ± 5.17%) cells (P < 0 01). Flow cytometry and TUNEL assays for apoptosis detection showed similar results. PUMA protein expression in MCF-7/PUMA cells was significantly higher than that in MCF-7 and MCF-7/pCDNA3 cells by Western blot analysis. Therefore, stable transfection of *PUMA* can significantly enhance epirubicin-induced apoptosis sensitivity of MCF-7 breast cancer cells.

Key words: *PUMA* gene; Breast cancer; MCF-7 cells; Apoptosis

