

Effect of recombinant human erythropoietin and doxorubicin in combination on the proliferation of MCF-7 and MDA-mb231 breast cancer cells

ABSTRACT

Patients with cancer often exhibit signs of anemia as the result of the disease. Thus, cancer chemotherapies often include erythropoietin (EPO) in the regime to improve the survival rate of these patients. The aim of the present study was to determine the effect of EPO on doxorubicin-treated breast cancer cells. The cytotoxicity of doxorubicin alone or in combination with EPO against the MCF-7 and MDA-MB-231 human breast cancer cells were determined using an MTT cell viability assay, neutral red (NR) uptake assay and lactate dehydrogenase (LDH) assay. The estimated half maximal inhibitory concentration values for doxorubicin and the combination of doxorubicin with EPO were between 0.140 and 0.260 $\mu\text{g/ml}$ for all cells treated for 72 h. Treatment with doxorubicin in combination with EPO led to no notable difference in cytotoxicity, compared with treatment with doxorubicin alone. The antiproliferative effect of doxorubicin at a concentration of 1 $\mu\text{g/ml}$ on the MDA-MB-231 cells was demonstrated by the decrease in viable cells from 3.6×10^5 at 24 h to 2.1×10^5 at 72 h of treatment. In order to confirm apoptosis in the doxorubicin-treated cells, the activities of caspases-3/7 and -9 were determined using a TBE assay. The results indicated that the activities of caspases-3/7 and -9 were significantly elevated in the doxorubicin-treated MDA-MB-231 cells by 571 and 645%, respectively, and in the MCF 7 cells by 471 and 345%, respectively, compared with the control cells. EPO did not modify the effect of doxorubicin on these cell lines. The results of the present study suggested that EPO was safe for use in combination with doxorubicin in the treatment of patients with breast cancer and concurrent anemia.

Keyword: Erythropoietin; Doxorubicin; Proliferation; MCF-7; MDA-MB231; Breast cancer