

Chemo-sensitivity of Two-dimensional Monolayer and Three-dimensional Spheroid of Breast Cancer MCF-7 Cells to Daunorubicin, Docetaxel, and Arsenic Disulfide.

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Abstract

BACKGROUND/AIM:

Chemo-sensitivity of two-dimensional (2D) monolayers and three-dimensional (3D) spheroids of human breast cancer MCF-7 cells were investigated.

MATERIALS AND METHODS:

MCF-7 cells were cultured in monolayers or spheroids established using a thermo-reversible gelatin polymer, in the presence of daunorubicin, docetaxel, or As₂S₂. Cell proliferation was examined by a Cell Counting Kit-8 assay.

RESULTS:

Daunorubicin, docetaxel, and As₂S₂ dose-dependently decreased the MCF-7 cell proliferation in both 2D- and 3D-culture systems. The 3D spheroids were less sensitive to these agents than the 2D cultured cells. Verapamil, an inhibitor of P-glycoprotein, partially enhanced the antiproliferative effects of the agents. DL-buthionine-(S, R)-sulfoximine significantly increased ($p < 0.05$), while

N-acetyl-L-cysteine significantly inhibited the antiproliferative effects of As₂S₂ (p<0.003).

CONCLUSION:

The 3D spheroids showed less sensitivity to the antiproliferative efficacies of anticancer agents than the 2D cultured cells.

P-Glycoprotein is suggested to be partially implicated in drug resistance. Reduction of cellular glutathione level enhanced the As₂S₂ cytotoxicity.

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KEYWORDS:

2D monolayer; 3D spheroid; Daunorubicin; arsenic disulfide; breast cancer MCF-7 cells; docetaxel