J Cancer Sci Ther 2018, Volume 10
DOI: 10.4172/1948-5956-C11-154

Determination of the effects of anticancer agent upon cellular growth and DNA intergrity using various cell line models

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Cancer is a group of diseases characterized by abnormal proliferation of cells beyond their natural boundaries. The tissue origin gives distinguishing characteristics of cancer and categorized into carcinomas, sarcomas, lymphomas and leukemia. Treatments available depending on the cancer stage includes radiation surgery, chemotherapy and hormone therapy. Chemotherapy involves the wide range of drugs killing cancer cells by means of cytotoxic killing either by damaging DNA or by disrupting cell growth and leads to apoptosis process. In the present study, an attempt was made to investigate the cytotoxic and potential of doxorubicin (DOX) against a panel of human tumor cell lines grown in vitro. This study also aimed to elucidate the mechanisms underlying the cytotoxic potential of doxorubicin against HCT and HepG2 cells. From the cytotoxic assay, it was found that among the cell lines tested, DOX was found to be most effective against HCT cell lines. Treatment of HCT cells with DOX resulted in a concentration-dependent decrease in the cell survival. Further, DOX treatment caused a significant increase in the genotoxicity as evidenced by the concentration-dependent elevation in the micronucleated binucleate cells (MNBNC) as well as Olive Tail Moment (OTM) values. Further, the DOX-induced apoptotic and necrotic mode of cell death was demonstrated by microscopic analysis. To conclude, the cytotoxic effect of DOX in HCT cells may be attributed to multiple mechanisms such as induction of oxidative stress, cell membrane damage and genotoxic effect, ultimately leading to cell death by both apoptosis and necrosis.

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