

Anticancer Study of Copper and Zinc Complexes with Doxorubicin

Authors : Grzegorz Swiderski, Agata Jablonska-Trypuc, Natalia Popow, Renata Swislocka, Wlodzimierz Lewandowski

Abstract : Doxorubicin belongs to the group of anthracycline antitumor antibiotics. Because of the wide spectrum of actions, it is one of the most widely used anthracycline antibiotics, including the treatment of breast, ovary, bladder, lung cancers as well as neuroblastoma, lymphoma, leukemia and myeloid leukemia. Antitumor activity of doxorubicin is based on the same mechanisms as for most anthracyclines. Like the metal ions affect the nucleic acids on many biological processes, so the environment of the metal chelates of antibiotics can have a significant effect on the pharmacological properties of drugs. Complexation of anthracyclines with metal ions may contribute to the production of less toxic compounds. In the framework of this study, the composition of complexes obtained in aqueous solutions of doxorubicin with metal ions (Cu^{2+} and Zn^{2+}). Complexation was analyzed by spectrophotometric titration in aqueous solution at pH 7.0. The pH was adjusted with 0.02M Tris-HCl buffer. The composition of the complexes found was Cu: doxorubicin (1: 2) and a Zn: doxorubicin (1: 1). The effect of Dox, Dox-Cu and Dox-Zn was examined in MCF-7 breast cancer cell line, which were obtained from American Type Culture Collection (ATCC). The compounds were added to the cultured cells for a final concentration in the range of 0,01 μM to 0,5 μM . The number of MCF-7 cells with division into living and dead, was determined by direct counts of cells with the use of trypan blue dye using LUNA Logos Biosystems cell counter. ApoTox-Glo Triplex Assay (Promega, Madison, Wisconsin, USA) was used according to the manufacturer's instructions to measure the MCF-7 cells' viability, cytotoxicity and apoptosis. We observed a decrease in cells proliferation in a dose-dependent manner. An increase in cytotoxicity and decrease in viability in the ApoTox Triplex assay was also showed for all tested compounds. Apoptosis, showed as caspase 3/7 activation, was observed only in Dox treatment. In Dox-Zn and Dox-Cu caspase 3/7 activation was not observed. This work was financially supported by National Science Centre, Poland, under the research project number 2014/13/B/NZ7/02 352.

Keywords : anticancer properties, anthracycline antibiotic, doxorubicine, metal complexes

Conference Title : ICACAC 2017 : International Conference on Advances in Chemistry and Applied Chemistry

Conference Location : Singapore, Singapore

Conference Dates : May 04-05, 2017