More Efficient Cancer Treatment Using Novel Ferrocene and Titanocene Derivatives

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Due to a growing number of patients diagnosed with cancer, constantly increasing resistance of cancer cells to the current chemotherapeutics such as cisplatin and large amount of adverse effects of chemotherapy, development of new anticancer drugs seems to be essential for progress in the further successful treatment of oncological diseases. This work focuses on the antitumor effects of two newly synthesized ferrocene and titanocene derivatives. The aim of this work was to determine the cytotoxicity of these compounds,reveal their mechanisms of action and compare their effects with commercial cisplatin. These new metallocene compounds were tested on human ovarian carcinoma cells, both resistant and sensitive to cisplatin. Various molecular biological and biochemical methods were employed to gain insight into the action of these potential drugs. Both derivatives had cytotoxic effects; ferrocene derivative showed distinctly higher cytotoxic and anti-proliferative effects on ovarian cancer cells compared to cisplatin. Importantly, this compound exhibited a significant cytotoxic effect also on cisplatin resistant cells. The mechanism of action was found to be different from cisplatin; apparently it does not bind to DNA,but it is linked with increased oxidative stress. This work has showed that ferrocene derivatives are very promising anticancer drugs, and gives impulse for further research of organometallic compounds as potential effective anticancer drugs with maximal curative effect,minimal toxicity for human organism and thus with a positive economical impact. The acquired knowledge will be used in the synthesis of the next generation of these compounds with improved activity, hopefully leading to the development of effective treatment of cisplatin resistant tumors.