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Combination of dirhenium cluster compounds and cisplatin in cancer

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Abstract

The novel antitumor system including cluster rhenium compounds with quadruple bonds and cisplatin (Re-Pt 4:1 system) has been recently presented that was effective in the model of rat's specific Guerink carcinoma T8 and against some human cancer cells. The cluster rhenium compounds with common formula $Re_2(RCOO)_nX_{6-n}$, where R = residues of isobutiric, pivalic, GABA, adamanthylcarbonic, ferulic acids; n = 2, 4; X = Cl, DMSO were the matter of concern. Parameters of oxidative stress in blood of experimental animals, state of liver and kidneys were investigated. We have developed a strategy for efficiently coencapsulation of rhenium- and platinum based drugs into 100 -105 nm-scale liposomes with resulting synergistic or additive effects *in vitro* and *in vivo*. Such "nanobins" can be used in anticancer trials and also for further surface modifications, varying with lipid component to obtain more stable vesicles and including targeted components. In obtained liposomes cluster center Re_2^{6+} were not destructed during some time, but there were some changes in ligand environment that took place due to substitution of carboxylate or chlorine groups on phosphatidyl choline or cisplatin and such equilibrium may make impact to a chemical potential of the encapsulated drugs. Introduction of liposomes, loaded with a dirhenium (III) carboxylate with cisplatin to tumor-bearing animals showed not only the same anticancer properties of the Re-Pt antitumor system but also demonstrated antioxidant, antihemolytic, hepato- and nephroprotecting abilities of the system.

Biography

Shtemenko Nataliia has completed her Ph.D in chemistry from Institute of Organic Chemistry (Moscow) and her Doctor's degree in biochemistry from Taras Shevchenko University, Ukraine (Kiev) in 1993. From 1996 she is the Head of Biochemistry Department in Dnipropetrovsk National University, Ukraine. In recent years she focused on the development of rhenium – platinum antitumor system that is effective in animal models and cancer cells, in modulation of cisplatin mechanism of action, antioxidant, hemolytic, hepato- and nephroprotective activity of dirhenium clusters with quadruple bond *in vivo*. In 2011-2012 she was a Fulbright scholar in A&M University (USA).