MITOCHONDRIA-TARGETED MESOPOROUS SILICA NANOPARTICLES NONCOVALENTLY MODIFIED WITH ALKYLTRIPHENYLPHOSPHONIUM CATION: ROLE OF LENGTH OF HYDROPHOBIC TAIL

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Targeted delivery of drugs has a special significance in the treatment of dangerous diseases, since it allows to reduce side effects, to increase bioavailability and to improve the effectiveness of the system. Recently, much attention has been paid to mitochondrion as a key target, which is due to their biochemical role in regulating the energy metabolism of cells. They also play significant role in the regulation of programmed death of the cell (apoptosis). Various compounds are used as vectors for mitochondria-targeted delivery of drugs including triphenylphosphonium (TPP) cation.

In this investigation, synthesis of mesoporous silica nanoparticles (MSN) noncovalently modified by alkyltriphenylphosphonium bromides with various hydrophobicity (TPPB-*n*, where *n* is the number of carbon atoms in *n*-alkyl tails; *n* = 7,9,16) has been performed. The main goal of the study was the revealing of the influence of the length of the alkyl tail on the permeability of mitochondrial membrane for drugs. Efficiency of modification, structural and morphological characteristics of obtained nanosystems have been evaluated using spectrophotometry, adsorption and desorption of nitrogen, IR spectroscopy, X-ray diffraction and thermogravimetric analyses and scanning electron microscopy. It has been calculated, that specific surface area of pores of MSNs modified by TPPB-7, TPPB-9 and TPPB-16 equals 1426 m²/g, 1315 m²/g and 891 m²/g, respectively. It has been revealed, that modified compositions exhibited insignificant cytotoxicity toward normal *Chang liver* cell lines and *WI38* lung tissue cells *in vitro*. Fabricated nanosystems demonstrated the capability to penetrate into *M-HeLa*, *A-549* and *PANR* tumour cells and selective toxicity toward cancer cells in TPPB-7 < TPPB-9 < TPPB-16 series.

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