Nanochemistry and biotechnology

Micelles of PAAc/PAAm Block Copolymers for Doxorubicin Delivery

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Two series of asymmetric PAAc/PAAm diblock and triblock copolymers. (DBCs and TBCs) with constant length of poly(acrylic acid) blocks and variable length of polyacrylamide blocks were synthesized using RAFT/ MADIX technique. Their micellization in dilute aqueous solutions, caused by hydrogen bonding of both the blocks, as well as the encapsulation of anticancer drug doxorubicin (Dox) into micellar carriers were studied by static light scattering, FTIR and UV-Vis spectroscopy, and TEM. A steady increase in DBC and TBC micelle stability with the lengthening "corona"-forming PAAm blocks was established. In DBC and TBC solutions small primary micelles (9-14 nm) and their fractal aggregates of different morphology were fixed. DBC micelles demonstrated higher encapsulation of Dox than TBC ones. Moreover, the effect of significant reduction in the encapsulation capability of DBC and TBC micelles at the increase in PAAm block length was revealed. The created micelle systems showed the enhanced cytotoxicity in vitro as compared to individual Dox (Fig. 1).

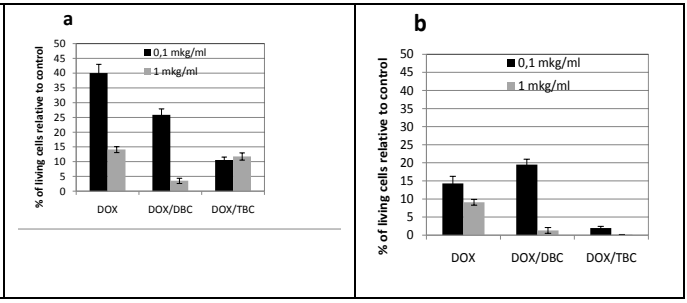

Fig. 1. The effect of individual Dox and Dox in micellar carriers on the quantity of human T-leukemia living cells after (***a***) 24 and (***b***) 48 incubation hours