DESIGN AND SYNTHESIS OF MULTIFUNCTIONAL POLYMER NANOCARRIER FOR CELLULAR AND SUBCELLULAR DRUG TARGETING

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The development of multifunctional nanoparticles capable of accomplishing multiple objectives, or performing a single advanced function through incorporation of different functional units is an important trend in modern nanomedicine [1]. In order to prepare such smart multifunctional nanocarriers, chemical moieties providing certain required individual properties have to be simultaneously assembled on the surface and within the structure of the same nanoparticle. Moreover, these individual moieties would need to function in a coordinated way to provide a desired combination of useful properties [2].

In the present contribution we report on the synthetic strategy towards multifunctional triblock copolymer nanocarrier that consists of biodegradable poly(D,L-lactide) hydrophobic core, polycationic poly(*N*,*N*-dimethylaminoethyl methacrylate) (PDMAEMA) block having weakly basic amino groups, and detachable in slightly acidic environment polyethylene glycol (PEG) shell. While the nanocarriers endosomal escape is granted *via* the proton sponge effect of PDMAEMA block, the cellular targeting properties of the system are provided by the lactosylated chain ends of the PEG moieties positioned on the particle surface and the subcellular targeting is provided by triphenylphosphonium ligands attached to the PDMAEMA polycationic block.

The copolymer's self-association and loading with the anticancer drug curcumin was investigated and some initial *in vitro* evaluations were performed.

[1] Bao G**,** Mitragotri S, Tong S, *Annu. Rev. Biomed. Eng.* **2013**, *15*, 253–82.

[2] Torchilin V, *Adv. Drug. Deliv. Rev.* **2012**, *64*, 302-215.