EVALUATION OF NEUROPROTECTIVE ACTION OF NANOENCAPSULATED CALPAIN INHIBITOR - MDL 28170

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Abstract

One of the “hot” topics of nanomedicine is the incorporation of the therapeutic agents inside biocompatible nanocarriers. The application of nanoparticulate pharmaceutical carriers increases in vivo bioavailability and efficiency of many drugs. Moreover, special surface modification/functionalization of nanocarriers can be used to control their biological properties in a desirable fashion and to enable them to perform therapeutic or diagnostic functions in right place and at right time. The nano-strategy also leads to the lowering of drug dose – reducing unfavorable side effects. Neurodegeneration diseases are one of the serious problem in a present day therefore we were focused on the preparation and application of nanoparticulate system for such area. Several techniques to prepare nanoparticles have been developed. In this paper we present polyelectrolytes nanocapsules with emulsion core synthesized by layer-by-layer (LbL) technique. The hydrophobic calpain inhibitor MDL 28170 was selected as model drug. Calpain is a calcium-dependent cytosolic cysteine protease that participates in necrotic and apoptotic neuronal cell death. Prepared nanoparticles were characterized for particle size, zeta potential and in vitro drug release. MTT and LDH assay was used to determine cytotoxicity of prepared capsules. The neuroprotective potential of nanoencapsulated calpain inhibitor MDL 28170 will be evaluated against H2O2 induced oxidative stress cytotoxicity in SH-SY5Y human neuroblastoma cell culture and in primary culture of mice neurons.

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