EMULSION-CORE AND POLYELECTOLYTE-SHELL NANOCAPSULES AS DRUG DELIVERY SYSTEM FOR UNDECYLENIC ACID

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Abstract

Nanocapsules with the core-shell structure were synthesized using microemulsification technique and layer-by-layer (LbL) saturation method. Hydrophobic cores were produced upon gentle stirring and were stabilized by the surfactant-polyelectrolyte complexes (e.g. AOT-PLL). Polyelectrolyte shell was synthesized by subsequently adsorbing of oppositely charged (bio)polymers on emulsion cores. PEG-ylated polyelectrolytes were also used in order to functionalize the external layer of nanocapsules. ROD/FITC-labelled polyelectrolytes were used for quantitative and qualitative cellular uptake determination. Model neuroprotective drug, UDA (undecylenic acid) was dissolved in the hydrophobic cores of nanocapsules. Nanocapsules were characterized for particle size (DLS, NTA) and zeta potential (LDE). SEM and NTA was used to visualize nanocapsules. MTT and LDH assays were used: to determine cytotoxicity of nanocapsules, to evaluate H_20_2, staurosporin or doxorubicin induced cytotoxicity as the cytotoxicity model and to assess the neuroprotective action of UDA. Cellular uptake was evaluated by flow cytometry, confocal microscopy and spectrofluorymetry. The SH-SY5Y human neuroblastoma was used as a model cell line. Statistical analysis was performed using ANOVA with Duncan post-hoc test. The results obtained demonstrate that obtained emulsion-core and polyelectolyte-shell nanocapsules might serve as a novel promising delivery systems for undecylenic acid.

Keywords: Nanocapsules, layer-by-layer, polyelectrolytes, cytotoxicity, neuroprotection, SH-SY5Y, undecylenic acid

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