

Encapsulation of curcumin in polyelectrolyte nanocapsules and their neuroprotective activity

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Curcumin, diferuloylmethane, is a component of turmeric, which comes from *Curcuma longa* herb. The studies have shown that curcumin reveals various biological actions. It exhibits prominent antioxidant and anti-inflammatory, antiviral, antibacterial and antifungal activities and it is used as a potential preventive agent in the treatment of many types of cancer. There is also evidence that curcumin exhibits neuroprotective effects. Poor water solubility and low bioavailability of lipophilic drugs like curcumin, can be potentially improved by use of delivery systems. In this study, encapsulation of nanoemulsion droplets was utilized to prepare curcumin nanocarriers. The droplets contained curcumin were encapsulated in polyelectrolyte shell formed by the layer by layer (LbL) adsorption of biocompatible polyelectrolytes: poly-L-lysine (PLL) and poly-L-glutamic acid (PGA). The size of synthesized nanocapsules was ~100 nm. Biocompatibility of synthesized nanocapsules and neuroprotective potential of encapsulated curcumin against the H₂O₂-induced cell damage of SH-SY5Y was evaluated using cell viability/toxicity assays. Curcumin encapsulated in our nanocapsules showed the improved neuroprotection activity when compared to curcumin pre-dissolved in DMSO. The obtained results indicate the utility of PLL/PGA nanocapsules as a promising alternative way of curcumin delivery for neuroprotective purposes with improved efficiency and reduced toxicity

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