

Levothyroxine-conjugated PEI as a nano-vector for plasmid DNA delivery

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Background and Aims: Among the new medical researches, gene therapy has been attracted many researchers. The main goal of these researches is developing a proper vector which can selectively and efficiently deliver a gene to the target cells with minimal toxicity. Polyethyleneimine (PEI) based vectors are one of the most popular carriers used in gene delivery.

Methods: In this study, a levothyroxine-conjugated PEI was synthesized to investigate the effectiveness of levothyroxine conjugation on PEI transfection efficiency, cytotoxicity, particle size and plasmid condensation ability. The polymers were characterized by instrumental methods e.g. ¹H NMR spectroscopy. The buffering capacity, zeta potential and particle size were measured to identify the effects of this modification on the ability of the polymers to show proton sponge effect and form nano-sized particle, respectively. Also the ethidium bromide exclusion assay was carried out to show the condensation ability of the modified polymers.

Results: The results showed that this modification leads to a nano-carrier with DNA condensation ability and biophysical properties comparable to golden standard PEI 25kDa.

Conclusions: Levothyroxine conjugation to PEI could be a strategy to improve PEI biophysical properties and may be used in further studies.

Keywords: Polyethyleneimine; Levothyroxine; Nano-carrier