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Directing the nanoparticle formation by the combination with small molecular assembly and polymeric assembly for topical suppression of ocular inflammation

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Abstract

In this paper, we presented a simple yet versatile strategy to generate a high drug payload nanoparticles by the combination with small molecular assembly and polymeric assembly for topical suppression of ocular inflammation. Upon physical mixing of the succinated triamcinolone acetonide (TA-SA) supramolecular hydrogel with the poly (ethylene glycol)-poly (ε-caprolactone)-poly (ethylene glycol) (PECE) aqueous solution at 37°C, TA-SA/PECE nanoparticles formed spontaneously and characterized thoroughly by transmission electron microscopy (TEM), X-ray diffraction (XRD) and differential scanning calorimetry (DSC). The formed TA-SA/PECE nanoparticles displayed a comparable *in vitro* anti-inflammatory efficacy to that of native triamcinolone acetonide (TA), through a significant downregulation of various proinflammatory cytokines levels (e.g., NO, TNF-α) in a lipopolysaccharide (LPS) actived RAW264.7 macrophage. Meanwhile, the enhanced transcorneal drug permeability of TA-SA/PECE nanoparticles over that of TA suspension was clearly observed in an isolated rabbit cornea. Intraocular biocompatibility test demonstrated that TA-SA/PECE nanoparticles presented good biocompatibility after topical instillation during entire study period. More importantly, the TA-SA/PECE nanoparticles displayed superior therapeutic efficacy over that of the TA suspension in the endotoxin-induced uveitis (EIU) rabbit model via decreasing neutrophil infiltration

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