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RESEARCH PAPER

Neutrophil-Mediated Delivery of Dexamethasone Palmitate-Loaded Liposomes Decorated with a Sialic Acid Conjugate for Rheumatoid Arthritis Treatment

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ABSTRACT

Purpose The aim of this research was to design dexamethasone palmitate (DP) loaded sialic acid modified liposomes, with the eventual goal of using peripheral blood neutrophils (PBNs) that carried drug-loaded liposomes to improve the therapeutic capacity for rheumatoid arthritis (RA).

Methods A sialic acid – cholesterol conjugate (SA-CH) was synthesized and anchored on the surface of liposomal dexamethasone palmitate (DP-SAL). The physicochemical characteristics and in vitro cytotoxicity of liposomes were evaluated. Flow cytometry and confocal laser scanning microscopy were utilized to investigate the accumulation of liposomes in PBNs. The adjuvant-induced arthritis was adopted to investigate the targeting ability and anti-inflammatory effect of DP loaded liposomes.

Results Both DP-CL and DP-SAL existed an average size less than 200 nm with remarkably high encapsulation efficiencies more than 90%. In vitro and in vivo experiments manifested SA-modified liposomes provided a reinforced accumulation of DP in PBNs. As well, DP-SAL displayed a greater degree of accumulation in the joints and a stronger anti-inflammatory effect in terms of RA suppression.

Conclusions SA-modified liposomal DP was a promising candidate for RA-targeting treatment through the neutrophil-mediated drug delivery system.

KEYWORDS L-selectin · peripheral blood neutrophils · rheumatoid arthritis · rheumatoid arthritis-targeting treatment · sialic acid-cholesterol conjugate

ABBREVIATIONS

CCK8	Cell Counting Kit-8
CLSM	Confocal laser scanning microscopy
DiR	1,1′-dioctadecyl-3,3,3′,3′-tetramethylindotricarbocyanine iodide
DP	Dexamethasone palmitate

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