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RESEARCH

Concanavalin-A Decorated Apremilast Loaded Lipidic Nanocapsules: Appraisal of Lectin-Mediated Targeting for Rheumatoid Arthritis Management

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Abstract

Rheumatoid arthritis (RA) is a persistent inflammatory condition primarily impacting small joints in its early stages and bigger joints in its later stages. Conventional therapy is often encountered with numerous limitations resulting in unsatisfactory clinical outcomes. Hence, probing novel compounds and amalgamating them with nanotechnology may increase efficacy in RA management. Apremilast (Apr), a PDE4 inhibitor, has shown potential for RA management; therefore, the current research focused on developing concanavalin-A (conA) decorated Apr-loaded lipidic nanocapsules (LNCs) employing layer-by-layer techniques using chitosan-conA layering. The developed LNCs were examined in vitro, cell lines, and in vivo animal models. Compared to the pure Apr, the LNCs demonstrated non-cytotoxicity in HEK-293 T cell lines, improved anti-rheumatoid efficacy, and decreased side effects in the complete Freund's adjuvant–induced animal model. Moreover, in vivo pharmacodynamics showed a significant decline in inflammatory parameters (C-reactive protein, adenosine deaminase, rheumatoid factor) and biochemical parameters (erythrocyte sedimentation rate, white/red blood cell count, hemoglobin). Further in vivo, pharmacokinetics revealed an augmented oral bioavailability when related to pure Apr. Thus, the anti-arthritic efficacy of Apr against RA was shown to be promising through the administration of conA-decorated Apr-loaded LNCs. Furthermore, the developed LNCs have the potential to be translated from the bench to the bedside.

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