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Lecithin/Chitosan Nanoparticles for Transcutaneous Immunization

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Transcutaneous immunization is an attractive mode of immunization due to improved safety, ease of use over needles, availability of large application areas and better patient compliance due to painless administration. In present study, Chitosan/lecithin nanoparticles (LCNs) incorporating model antigen Ovalbumin (OVA) was prepared and evaluated for their immune stimulating efficacy following topical application. OVA loaded LCNs were prepared and characterized for size, shape, antigen loading efficiency, zeta potential and antigen integrity. In vitro permeation study was performed in rat skin using Franz diffusion cell. Skin penetration efficiency of LCNs was assessed by fluorescence microscopy. NPs were characterised by prolonged release profiles with an initial burst (approximately 25%), followed by a slow release phase Immune stimulating efficacy of nanoparticles was assessed by measuring the antigen specific serum IgG antibodies following transcutaneous immunization in Albino rats and results were compared with the alum adsorbed OVA given intramuscularly and topically administered plain aqueous OVA solution. Result shows that optimal LCN formulations could entrap 38.12±0.33 of initial antigen with particle size range of 283±29 nm and negative zeta potential -17.2±3.2 mV. OVA permeability from an LCNs suspension was significantly improved compared to the permeability of OVA from the solution ($P<0.001$). LCNs provided -2.3-fold higher flux compared to OVA solution. Fluorescent counterparts of these particles were confirmed to accumulate deep in the epidermal region of skin. It was found that serum IgG titers after three consecutive high dose of topical administrations followed by booster doses at 14 and 28 days of OVA loaded LCNs were comparable with OVA/alum formulations given by intramuscular route, suggesting an effective stimulation of serum immune response. Results suggest that the investigated CLNs systems could be effective as topical delivery of vaccines.

once administered intramuscularly to form the depot. The aqueous phase transition method was used for determining the microemulsion region and optimizing the SMEDDS formulation. The optimized formulation was characterized by optical isotropy, FTIR, polarizing optical microscopy, particle size analysis, gelling behaviour and spreadability in aqueous environment at 37°C, optical microscopy, in situ gelling in chicken muscles and in-vitro drug release studies. The polarizing optical microscopy reveals the gelling of the formulation due to the polymer at the body conditions. The in-vitro drug release showed a sustained release of the SMEDDS formulation for seven days with a zero order release kinetics model. The sol-gel conversion of the formulation was confirmed at 37°C by formation of a gel in aqueous environment maintained at 37°C. The particle size analysis confirm the formation of a microemulsion a condition wherein the SMEDDS would enter the blood stream leaving the gel matrix and self emulsify. After viewing the results it could be concluded that SMEDDS based thermally triggered in situ gelling implant for sustained release of rifampicin can be an alternative approach wherein the dosage administration is once in a week and further the myotoxicity studies need to be performed to check the toxicity of the formulation.

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