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School of Pharmacy and Pharmaceutical Sciences
Isfahan University of Medical Sciences

Preparation and characterization of nanoliposomes containing soluble Leishmania antigens and MPL adjuvant

A. Badiee[1,*], M. Jaafari[2], A. Khamesipour[3], A. Abbasi[1], Z. Saberi[1]

[1]Nanotechnology Research Center, School of Pharmacy, Mashhad University of Medical Sciences (MUMS), Mashhad, Iran
[2]Biotechnology Research Center, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
[3]Center for Research and Training in Skin Diseases and Leprosy, Tehran University of Medical Sciences, Tehran, Iran

Background and Aims: Numerous attempts have been done to develop an effective vaccine against Leishmaniasis. However, Based on the clinical trials results, non of these vaccines confirmed for widespread vaccination yet, mainly due to the lack of a suitable adjuvant. Using of cationic liposome as a vaccine delivery system is highly regarded. Moreover, adding immunostimulatory agents into vaccine delivery systems caused in focusing their effects onto the antigen-presenting cells (APCs) and maximize the potency of vaccine.
Methods: In this study, soluble Leishmania antigen (SLA) used as a first generation Leishmania vaccine. Cationic liposome as a delivery system and monophosphoryl lipid A (MPL) as an immunostimulatory adjuvant was used. Liposomes consisting of 1,2-dioleoyl-3-trimethylammonium-propane (DOTAP) as a cationic lipid, cholesterol and MPL, prepared by Thin film method with some modification. Liposomes characterized in terms of their size and surface charge by zetasizer. The amount of SLA loading were assigned by BCA protein asssay method and the presence of SLA in formulations has been confirmed by SDS-PAGE analysis. The amount of phosphate in formulations was determined by Bartlett assay to demonstrate the presence of MPL in liposome structure.
Results: The average size of liposomes containing SLA was in the range of 200-400 nm, and their zeta potentials were positive because of the presence of DOTAP. The loading percent of SLA in liposomes was 27% in extrusion method and 62% in sonication method. The results of Bartlett assay showed that 92% of MPL was loaded into liposome bilayer.
Conclusions: In conclusion, sonication method caused in heterogenous liposomes with larger particle size, but this method is more suitable for future in vivo studies because of higher antigen encapsulation. This study also demonstrate the high retention of MPL in liposome structure.

Keywords: Vaccine; Liposomes; Leishmaniasis