

Preparation and characterization of PLGA nanospheres encapsulated with Autoclaved Leishmania major (ALM) and Quillaja saponin

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Abstract

Several antigens, adjuvants and delivery systems have been evaluated for induction of protective immune responses against leishmaniasis, but have mostly been inefficient. In this study, poly (d,l-lactide-co-glycolide) (PLGA) nanospheres as antigen delivery system and Quillaja saponins (QS) as an immunoadjuvant have been used to increase the immune responses against Autoclaved Leishmania major (ALM). PLGA nanospheres were prepared using a double emulsion (W/O/W) technique. The internal aqueous phase contained ALM and saponin, while the oily phase contained the solution of PLGA in dichloromethane and the external aqueous phase was polyvinyl alcohol (PVA) 4.0% (W/V) solution. Particulate characteristics were studied by scanning electron microscope and particle size analyzer. The encapsulation efficiency was determined by Lowry method and the release profile of antigen and saponin from nanospheres was evaluated for one week. Nanospheres were spherical in shape having smooth surfaces. Mean diameters for nanospheres loaded with ALM and ALM+QS were 300 ± 122 nm and 294 ± 106 nm respectively. Encapsulation efficiencies for ALM and QS were found $71 \pm 14.8\%$ and $80.8 \pm 23.1\%$, respectively. Evaluation of the release profiles of ALM and QS from nanospheres in one week showed that $44.8 \pm 0.8\%$ of ALM and $29.0 \pm 0.21\%$ of QS had been released from nanospheres. In conclusion, the prepared nanospheres with desirable size, encapsulation efficiency, and slow rate of release, had acceptable features for future in vivo studies.

Reaxys Database Information

Author keywords

Autoclaved Leishmania major (ALM); PLGA nanosphere; quillaja saponin; Vaccine

Indexed Keywords

EMTREE drug terms: antigen; dichloromethane; immunological adjuvant; Leishmania vaccine; nanosphere; polyglactin; polyvinyl alcohol; saponin

EMTREE medical terms: analyzer; antigen expression; aqueous solution; article; autoclave; drug delivery system; drug screening; drug synthesis; emulsion; encapsulation; immune response; immunogenicity; Leishmania major; leishmaniasis; particle size; particulate matter; pharmaceutical engineering; Quillaja; scanning electron microscope; scanning electron microscopy

Chemicals and CAS Registry Numbers: dichloromethane, 75-09-2; polyglactin, 2678-00-7, 34346-01-0; polyvinyl alcohol, 2528-09-3, 9002-89-0; saponin, 8047-10-2

Manufacturers: Drug manufacturer: Boehringer Ingelheim, Germany.

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