

## Coencapsulation of CpG oligodeoxynucleotides with recombinant *Leishmania* major stress-inducible protein $\gamma$ in liposome enhances immune response and protection against leishmaniasis in immunized BALB/c mice

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### Abstract

CpG oligodeoxynucleotides (CpG ODN) have been shown to have potent adjuvant activity for a wide range of antigens. The purpose of this study was to determine the potential benefit of using liposomes as a delivery vehicle to enhance the adjuvant activity of CpG ODN with *Leishmania* major stress-inducible protein  $\gamma$  (LmSTI $\gamma$ ) antigen in induction of the Th $\gamma$  response in a murine model of leishmaniasis. BALB/c mice were immunized subcutaneously three times in 2-week intervals with liposomal recombinant LmSTI $\gamma$  (Lip-rLmSTI $\gamma$ ), rLmSTI $\gamma$  coencapsulated with CpG ODN in a liposome (Lip-rLmSTI $\gamma$ -CpG ODN), rLmSTI $\gamma$  plus CpG ODN in phosphate-buffered saline (PBS), rLmSTI $\gamma$  plus non-CpG ODN in PBS, rLmSTI $\gamma$  in PBS, empty liposome, or PBS. The intensity of infection induced by *L. major* promastigote challenge was measured by footpad swelling. A significant ( $P < 0.001$ ) inhibition of infection in mice immunized with Lip-rLmSTI $\gamma$ -CpG ODN was shown compared to the other groups, and no parasite was detected in the spleens of this group 14 weeks after challenge. The highest immunoglobulin G $\gamma$ a (IgG $\gamma$ a) titer and the highest IgG $\gamma$ a/IgG $\gamma$  ratio were also shown in the sera of mice immunized with Lip-rLmSTI $\gamma$ -CpG ODN before and 14 weeks after challenge. The results indicated the superiority of CpG ODN in its liposomal form over its soluble form to induce the Th $\gamma$  response when used in association with rLmSTI $\gamma$  antigen. It seems that using a liposome delivery system carrying CpG ODN as an adjuvant coencapsulated with *Leishmania* antigen plays an important role in vaccine development strategies against leishmaniasis. Copyright © 2008, American Society for Microbiology. All Rights Reserved.

### Reaxys Database Information

### Indexed Keywords

**EMTREE drug terms:** CpG oligodeoxynucleotide; immunoglobulin G; immunoglobulin G $\gamma$ ; immunoglobulin G $\gamma$  antibody; immunoglobulin G $\gamma$ a; immunoglobulin G $\gamma$ a antibody; immunological adjuvant; *Leishmania* vaccine; liposome; phosphate buffered saline; recombinant protein; recombinant stress inducible protein  $\gamma$

**EMTREE medical terms:** animal cell; animal experiment; animal model; antibody response; antibody titer; article; controlled study; drug delivery system; drug potency; encapsulation; female; foot pad; immune response; immunization; *Leishmania* major; leishmaniasis; mouse; nonhuman; priority journal; promastigote; swelling; Th $\gamma$  cell

**MeSH:** Animals; Antibodies, Protozoan; Electrophoresis, Polyacrylamide Gel; Female; Heat-Shock Proteins; *Leishmania* major; Leishmaniasis, Cutaneous; Liposomes; Mice; Mice, Inbred BALB C; Oligodeoxyribonucleotides; Protozoan Proteins; Protozoan Vaccines; Recombinant Proteins; Spleen; Th $\gamma$  Cells

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