

## Preparation and characterization of LPD nanoparticles containing rgp63 and rLmaCIN as a vaccine against cutaneous leishmaniasis

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**Background and Aims:** The current study was designed to evaluate the efficacy of Liposome-Protamine-DNA nanoparticle (LPD) containing immunostimulatory CpG oligodeoxynucleotides (CpG ODN) which is an improved adjuvant delivery system, in combination with leishmania antigens including, rgp63, rLmaCIN and rgp63/rLmaCIN in the induction of cell mediated immunity and protection against cutaneous leishmaniasis (CL) in murine model of leishmaniasis.

**Methods:** Female BALB/c mice were immunized subcutaneously three times in 3-week intervals with LPD-rgp63, LPD-rLmaCIN, LPD-rgp63/rLmaCIN nanoparticles or other control groups. After challenge with leishmania promastigotes 1.5 weeks following the last booster, mice were evaluated regarding footpad swelling, types of generated immune response and the load of parasites in the spleen.

**Results:** The results showed that vaccination with LPD nanoparticles containing rgp63/rLmaCIN and LPD-rLmaCIN was able to control infection and significantly reduce lesion development in susceptible BALB/c mice compared with control groups. Besides, protection was associated with a strong antigen-specific IFN- $\gamma$  production and also a reduced number of parasites in the spleens of mice compared with control groups.

**Conclusions:** Taken together these data indicate that LPD nanoparticles, when used as a vaccine adjuvant with recombinant leishmania major proteins including rLmaCIN and rgp63 could induce a protective immune response and protect against the development of progressive cutaneous lesion and uncontrolled parasites proliferation in leishmania major-infected normally susceptible BALB/c mice.

**Keywords:** LPD nanoparticles; rgp63; rLmaCIN; Cutaneous leishmaniasis