

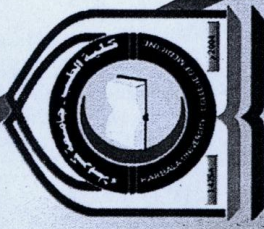
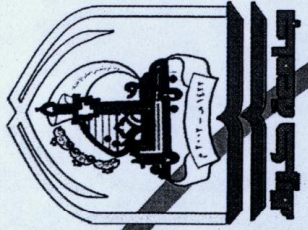
## **DNA Vaccine Induce Protective Immune Responses against *Leishmania Major***

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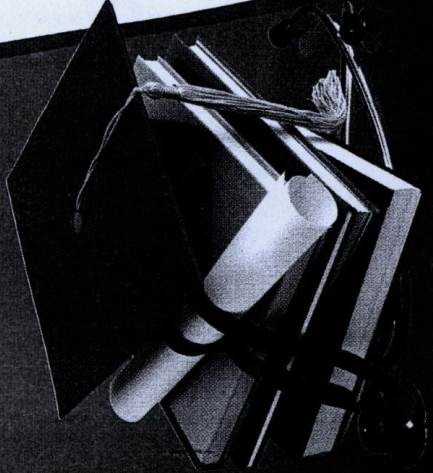
Leishmaniasis is an important disease in human. LACK and TSA as immuno-dominant antigens of *Leishmania major* are considered the most promising molecules for a DNA vaccine. We constructed a DNA cocktail, containing plasmids encoding LACK and TSA genes of *Leishmania major* and evaluated the immune response and survival rate in BALB/c mice. IgG and IFN- $\gamma$  values were noticeably increased in the immunized group with DNA cocktail vaccine, which were significantly higher than those in the single-gene vaccinated and control groups ( $p < 0.05$ ) following the immunization and after challenging with *Leishmania major*. IL-4 values were decreased in all immunized groups, but only in DNA vaccine cocktail and single-gene vaccination with pc-LACK there were statistical differences with control groups ( $p > 0.05$ ). The immunized mice with the cocktail DNA vaccine presented a considerable reduction in diameter of lesion compared to other groups and a significant difference was observed ( $p < 0.05$ ) in this regard. The survival time of the immunized mice with the cocktail DNA vaccine was significantly higher than that in the other groups ( $p < 0.05$ ) after their being challenged with *Leishmania major*. The findings of this study indicated that the cocktail DNA vaccine increased the cellular response and survival rate and induced protection against infection with *Leishmania* in the mice.

**Key words:** DNA vaccine, *Leishmania major*, Immune responses.



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