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Commentary

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DNA vaccines: The first generation vaccine

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DESCRIPTION

Leishmaniasis is a major infectious disease that affects people all over the world. Among all the different forms of the disease, cutaneous *leishmaniasis* has the highest global incidence. Many trial vaccines have been developed in order to generate long-term cell-mediated immunity against *Leishmania* major. Because there is no multi-epitope DNA vaccine with high efficacy against L. major, the goal of this study is to design a new multi-epitope DNA vaccine in order to control this infectious disease effectively using immune bioinformatics. The L-major antigens: Gp63, LACK, TSA, LmSTI1, and KMP11 were selected to design a multi-epitope DNA vaccine. The Immune Epitope Database was used to predict MHC-I antigen epitopes, and the selected epitopes were used to construct vaccines with linkers. A new multi-epitope vaccine was designed and inserted between the BamH1 and HindIII restriction sites of the pCDNA3.1 mammalian expression vector. Two servers chose 12 epitopes from among the antigens. They had high stability and high antigenic power. The ProtParam server measured the physicochemical properties of the vaccine, and this structure was thermos table and hydrophilic. It's a good model for studying the animal and human phases. The designed vaccine is expected to be an effective candidate for vaccine development. However, the efficacy of this vaccine should be evaluated in an in vivo model. *Leishmaniasis* is a parasitic disease caused by the genus *Leishmania* that ranges from self-healing cutaneous *leishmaniasis* to lethal visceral *leishmaniasis*.

Currently, *leishmaniasis* is treated with a variety of drugs, including pentagonal antimony, amphotericin B, miltefosine, and paromomycin, all of which have side effects. The most effective way to eradicate this infectious disease is through vaccination. Scientists have investigated the structure of various vaccines, including killed parasite vaccines, subunit vaccines, and DNA vaccines. There have been very few clinical trials of *Leishmania* vaccines. Therefore, we need more studies to find a good way to treat the disease.

CONCLUSION

In order to produce an effective vaccine, it is important to know the host's immune system. Strongly produced cytokines, particularly IFN-, play critical roles in CL infection control. In patients with CL infection, T helper cells and cytokines are stimulated. The T1 has been reported to be the most effective. Furthermore, macrophages demonstrate significant defence capabilities. They are activated by T-cell-derived cytokines, which are essential for controlling or aggravating the disease. Macrophages are a type of antigen-presenting cell that recognizes *Leishmania* antigens. As a result, there is a critical need for the development of a vaccine that can provide more effective immunity than previous vaccines. Along with the various types of vaccines studied, the use of DNA vaccines has shown promising results. However, using these antigens in the form of proteins is fraught with complications, such as high production costs, short half-lives, poor immunogenicity, low stimulation of cellular immunity, and cross-allergic reactions.

The CL's first-generation vaccine is made up of live, attenuated, and fragmented parasites. Which is simply a class of human prophylactic VL vaccine that has reached phase III clinical trials? However, this vaccine did not produce satisfactory results. Recombinant *Leishmania* antigens are used to create second-generation vaccines.