

# Protection efficacy induced by nanoliposomal soluble antigens as a vaccine candidate against *Toxoplasma gondii* RH strain in BALB/c Mice

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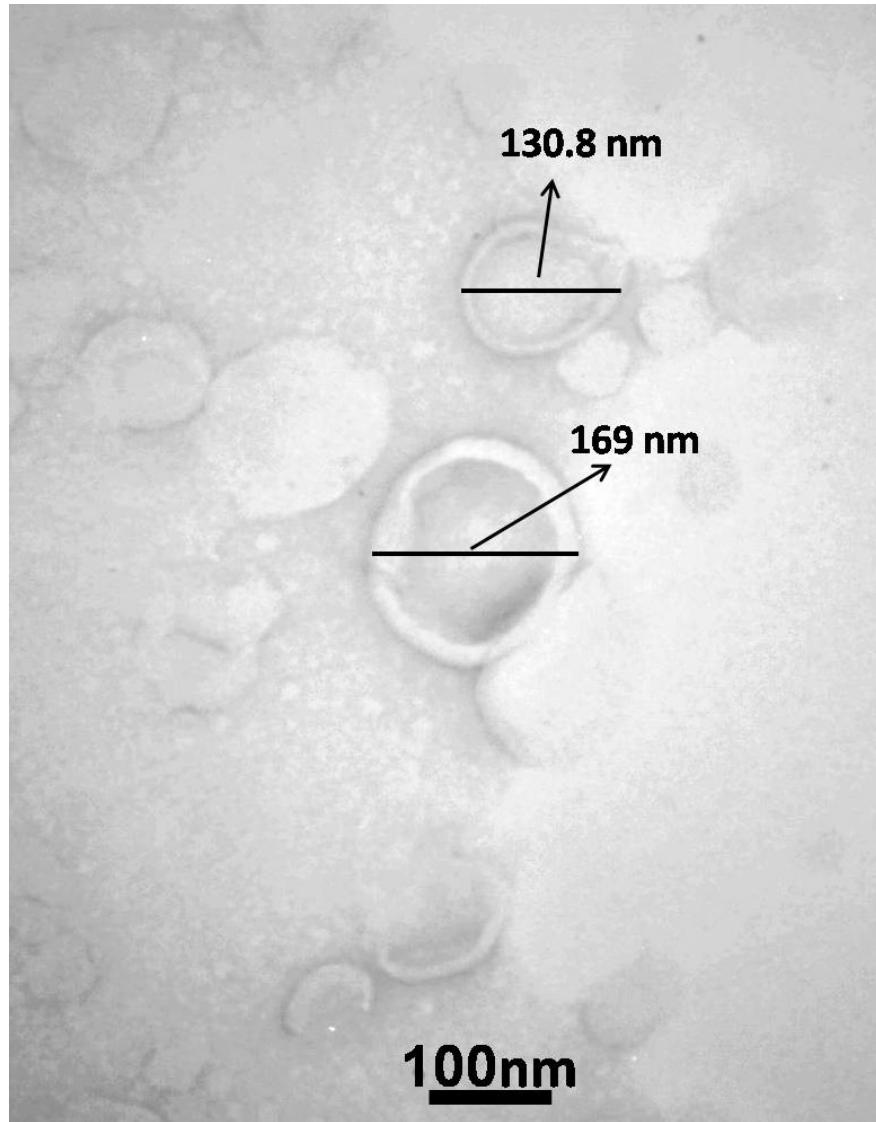
July 1, 2020

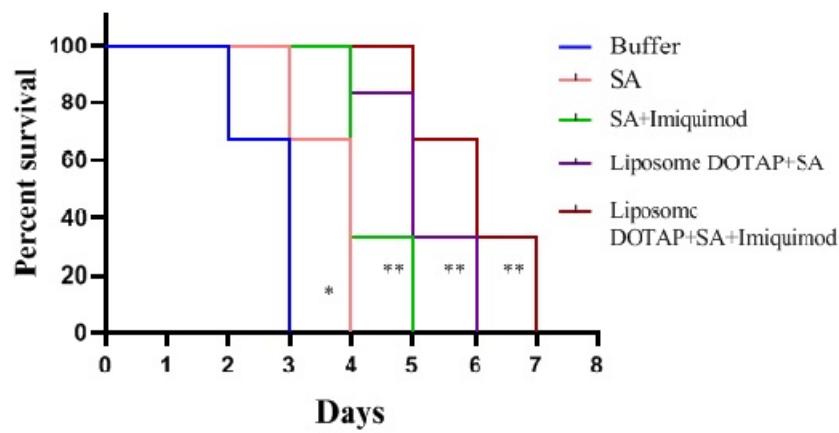
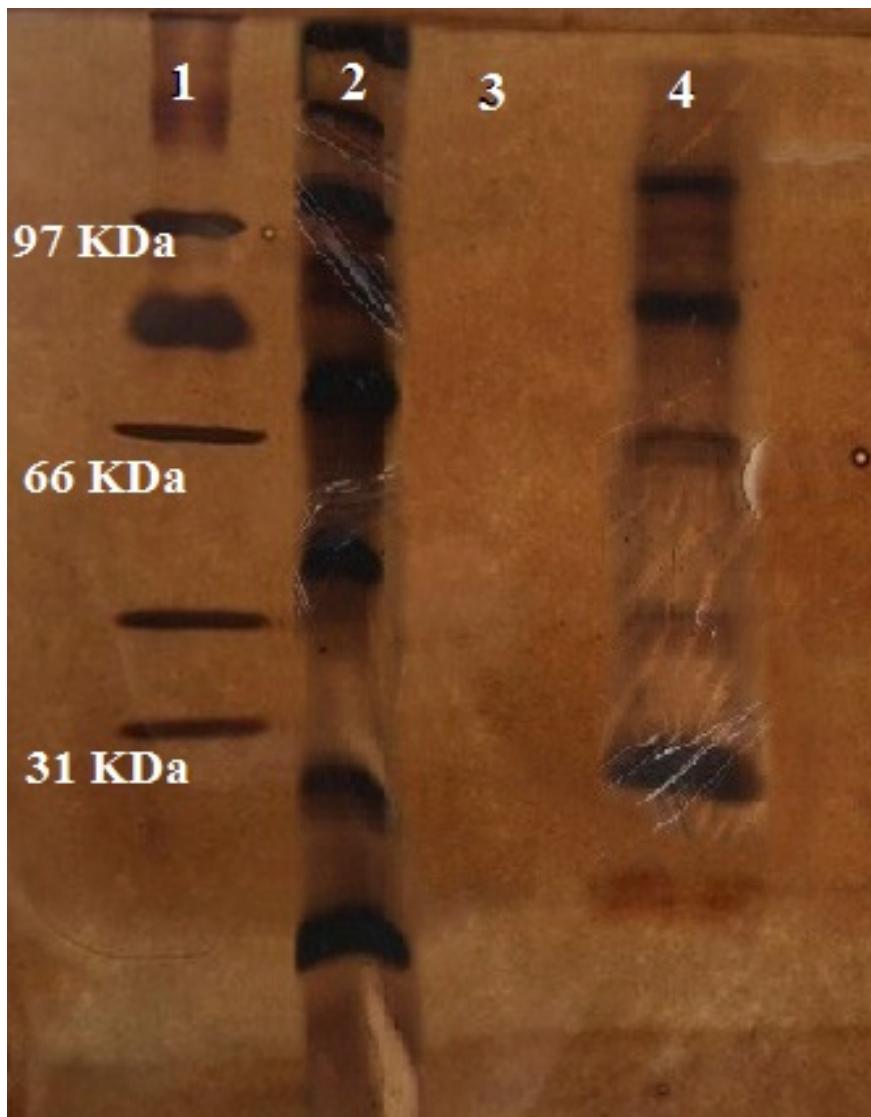
## Abstract

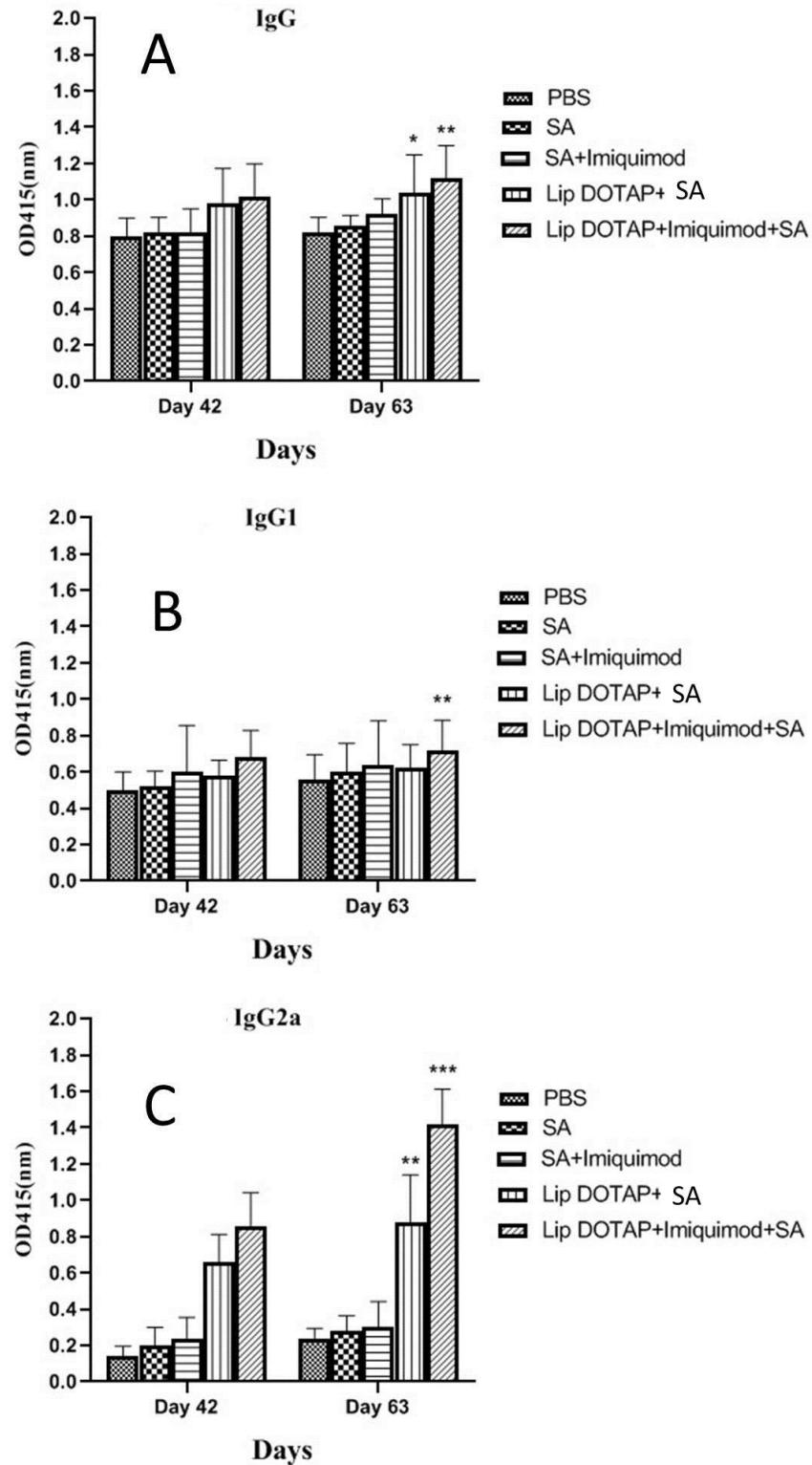
An effective vaccine against *Toxoplasma gondii* is an ideal strategy for controlling acute or chronic toxoplasmosis. In order to boost immune reactions to various antigens, liposomes may be utilized as immunoadjuvants. We encapsulated soluble *Toxoplasma* antigen (SA) and imiquimod adjuvant in 1, 2-Dioleoyl-3-trimethylammonium Propane (DOTAP) liposomes to evaluate the immune response induced by this vaccine. Three times with 2-week intervals, BALB/C mice were immunized subcutaneously with different formulations. The type of generated immune reaction, as well as the protection extent, was assessed through the percent survival survey of BALB/c mice after challenge with *Toxoplasma gondii*, the evaluation immune reaction with the generation of cytokine (IFN- $\gamma$ , IL-4), and titration of IgG isotypes. Less mortality was observed in the immunized mice by liposome DOTAP + imiquimod + SA that was meaningfully different ( $P<0.01$ ) in comparison to other groups. The IgG2a and IFN- $\gamma$  secretion highest levels were seen with liposome DOTAP + imiquimod + SA more than the control group ( $P<0.001$ ) and ( $P<0.0001$ ), respectively. The results of this research reveal that a cellular immune reaction is produced by the formulation of liposome DOTAP + imiquimod + SA, which is protective facing *T. gondii* challenge

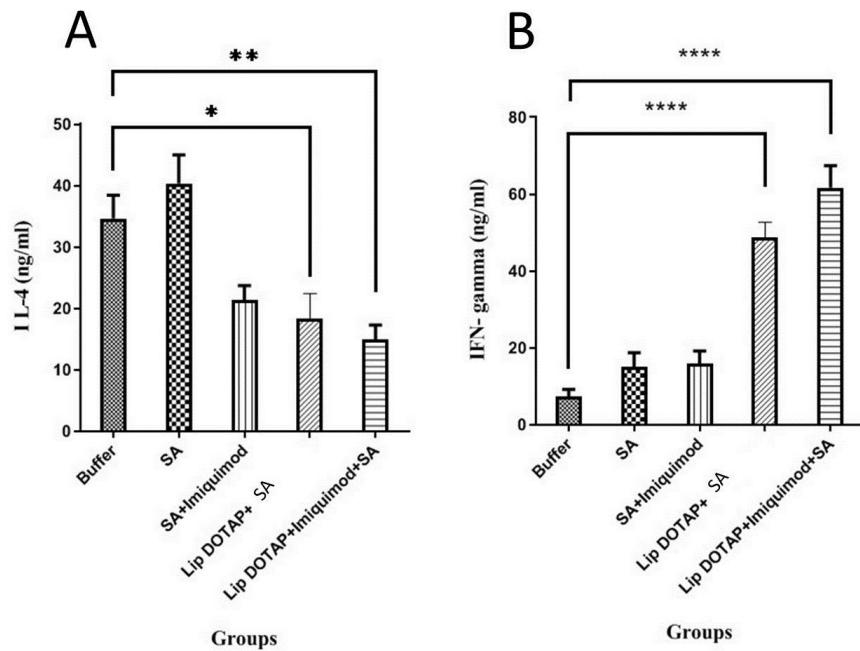
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Formulation	Size(nm)	Zeta Potential (mv)	PDI	Entrapment Efficiency
<b>Empty liposome</b>	217±15	23.5±2	0.238±0.01	-
<b>Liposome+SA</b>	225±18	4.5±3	0.326±0.01	57±14%
<b>Liposome+SA+Imiquimod</b>	231±14	2.4±6	0.365±0.01	52±9%