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Liposomes as a delivery platform of vaccines against group a *Streptococcus*

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For the past decade, Group A *Streptococcus* (GAS) has been one of the top ten pathogens causing mortality and morbidity. Treatment with antibiotics has proven to be successful; however, the lack of early medical attention could lead to invasive GAS infection. In addition, rheumatic heart disease, dubbed as the 'silent killer', is the most critical sequelae of GAS, claiming more than 1 million lives each year. Our vaccine strategy utilizes the lipid core peptide (LCP) as a self-adjuvanting system in conjunction with liposomes as a delivery system. Liposomes are known for their efficacy in delivering antigens as well as for their targeting capability.

Two epitopes were used, a) J14, KQAEDKVKASREAKKQVEKALEQLEDKVK, derived from the surface associated M protein of GAS; b) P25, KLIPNASLIENCTKAEL, a universal T-helper epitope. Seven different peptides (branched and linear), were synthesized using standard solid phase peptide synthesis and purified ($\geq 95\%$) to attain moderate to high yields (44-80%).

Liposomes were formulated giving an average size of 170 nm and a zeta potential of +57 mV. All compounds had varying percentages of encapsulation efficacy $\geq 65\%$. The lead vaccine candidate (liposomes encapsulating P25-K(J14)-LCP) had the highest encapsulation efficacy of 98%. Mice immunized intranasally with the lead vaccine candidate elicited the highest IgG and IgA antibody titres against J14 compared to all vaccine candidates and positive controls which included known adjuvant, cholera toxin B subunit. In addition, mice also retained high levels of serum IgG five months post final immunization. In conclusion, we prepared the first LCP-nanoliposome-based peptide vaccine candidate against GAS.

Biography

Khairunnisa graduated with a Diploma in Pharmaceutical Sciences and Technology from Temasek Polytechnic, Singapore in 2010. Upon graduating, she obtained a Bachelor of Science (Biochemistry) with Honours Class I from the University of Queensland, Australia in 2012. She is currently holding a University of Queensland International Scholarship for her postgraduate studies. During her studies, she has received various travel awards to attend workshops and conferences abroad. Currently, she is finalizing her PhD under the supervision of Prof. Istvan Toth and Dr. Mariusz Skwarczynski at the University of Queensland.

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