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# Trimethyl chitosan-based self-adjuvanting delivery system for peptide vaccine against Group A Streptococci (GAS) infection

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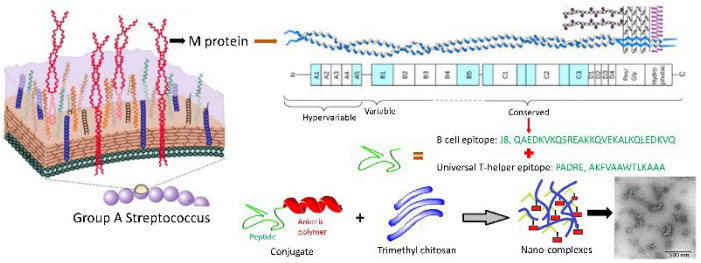
**Statement of the Problem:** Vaccination is cost-effective approach to enhance the host immunity against infections. Traditional vaccines comprised of live/attenuated or killed microorganism have been efficacious against many diseases such as influenza, small-pox, chicken-pox, etc. However, pathogen-based vaccines may also be associated with risks of allergic responses. In recent years, new generation peptide-based vaccines have gained attention in vaccinology field, because of their safety profile and cost-effective production. Peptide-based vaccines utilize a small defined peptide fragment responsible for induction of immune responses which make them safer than other types of vaccines, but it also reduces its immunogenicity because of lack of danger signals. Hence, vaccine formulation into nano-complexes with the help of polymers enhances immunogenicity of peptide vaccines by improving entry and access into antigen-presenting cells.




Schematic representation of B-cell GAS epitope J8 derived from M-protein and formulation of nano-complexes with TMC.

**Aim:** The purpose of this study is to develop a Trimethyl-Chitosan (TMC) polymer-based peptide nano-vaccine against Group A Streptococcus (GAS) infection.

**Methodology:** A peptide comprising of B-cell epitope from GAS M-protein (J8, QAEDKVKQSREAKKQVEKALKQLEDKVQ) and a universal T-helper cell epitope (PADRE, AKFVAAWTLKAAA) was conjugated to anionic polymer which then formed nano-complexes with TMC. J8-specific antibody titers were evaluated after intranasal administration of nano-complexes in C57BL/6 mice. The mice were challenged with M1 GAS strain 20 days after second boost and bacterial burden in Nasal Associated Lymphoid Tissue (NALT), throat swabs and nasal shedding was determined. Additionally, the opsonic activity of generated serum IgG antibodies was evaluated against various GAS strains.

**Findings:** TMC-based nano-complexes were effective in generating high serum IgG and salivary IgA titers compared to negative control (PBS) mice group. Nano-complexes showed a reduction in bacterial load following intranasal M1 GAS challenge and also induced high opsonic IgG antibody titers.

**Conclusion:** Developed vaccine delivery system based on TMC nano-complexes possessed adjuvanting properties and hence, it could be used to improve poor immunogenicity of peptide vaccines.

## Biography

Reshma J Nevagi is a PhD Research Scholar at Faculty of Science, University of Queensland (UQ), Australia. Prior to UQ, she pursued Master of Pharmacy (MPharm) from Pune University, India. Currently, she is working in vaccinology field with Professor Istvan Toth and her research interest is to develop self-adjuvanting delivery systems for peptide-based vaccines. Her project involves interdisciplinary research including peptide synthesis, nanoparticles formulation, physicochemical characterization and immunological evaluation. Her aim is to do significant research contribution to develop prophylactic peptide vaccine for group A Streptococci (GAS) infection.

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