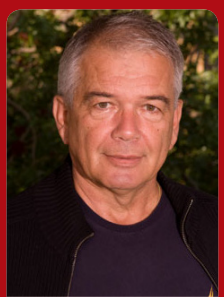
PULSUS
WWW.PULSUSCONFERENCE.COM

Istvan Toth, J Pharm Drug Deliv Res 2018, Volume 7
DOI: 10.4172/2325-9604-C4-034

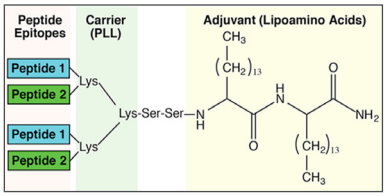
World Congress on
Drug Delivery, Formulation and Analytical Techniques
July 02-03, 2018 New Orleans, USA

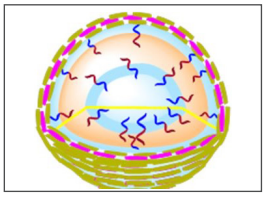


Istvan Toth
University of Queensland, Australia

Lipophilic vaccine delivery systems

Infection with group A *streptococci* (*Streptococcus pyogenes*, GAS), one of the common and widespread human pathogens, can result in a broad range of diseases, with the potential of acute and post-infectious rheumatic fever and rheumatic heart disease. Immunity to GAS relies on the production of opsonic antibodies specific to the hyper-variable N-terminal and conserved C-terminal regions of the coiled-coil α-helical M protein, the major virulent factor in GAS. The development of an effective vaccine for GAS has been challenged by the induced autoimmunity of epitopes derived from the C-terminal regions, unsuitable B-cell epitopes that have been shown to react with human heart tissue and the minimal B-cell epitopes, which believed to be safe, shows little or no immunogenicity unless bound to a delivery platform. For vaccine delivery, self adjuvanting Lipid Core Peptide (LCP) and polymer coated liposome systems including antigen, carrier and adjuvant within the same molecular entity has been developed. The systems allow the attachment of multiple copies of antigens. We synthesized a dendritic structure (LCP) consisting of a lipoamino acids, polylysine carrier and a peripheral generation of the minimal B-cell epitope (J14) and CD4+ T helper cell epitope (P25). The peptide dendritic core and the epitopes were synthesized using solid phase peptide synthesis. Blank liposomes which contained the LCP were formulated and optimized for charge and lipid content using a thin film formation method. Optimized liposomes were coated with positively charged Trimethyl Chitosan (TMC) then negatively charged sodium alginate in a layer-by-layer approach. These formulations were subsequently characterized by Dynamic Light Scattering (DLS) and Transmission Electron Microscopy (TEM). Optimized formulations were further investigated for their efficiency of uptake by intestinal immune cells and ability to induce mucosal IgA and systemic IgG responses after oral administration. New peptide and coated liposome based vaccine delivery systems were developed. The LCP amphiphilic construct was incorporated into liposomes to produce particles with desired size. The construct alone elicited high-levels of antibody titers comparable to that of positive control (J14 + Complete Freund's adjuvant). Interestingly, physical mixture of any of the dendrimer core and peptide epitope did not demonstrate immunological response. Large proportion of systemic antibodies elicited by J14-D immunized mice recognized also native GAS M protein derived sequence p145. The developed strategy to produce nanoparticles, consisting of a peripheral antigenic epitope layer conjugated to a dendrimer core, which is both self-adjuvanting and produces a strong immune response to the GAS M-protein, offers an attractive alternative to conventional vaccine approaches. The greatest advantage of this system is that it can generate protective immune response after oral administration. Our dendrimer-nanoparticles vaccine approach should be readily acquiescent to other pathogenic organisms in addition to GAS and may prove particularly useful for the design of vaccines against infection deceases know to stimulate autoimmune response in a host.





Biography

Istvan Toth is a Professor of Pharmacy, University of Queensland, Brisbane, Australia and affiliated Professorial Research Fellow and Group Leader at Institute of Molecular Biosciences, University of Queensland, Australia. He has completed his graduation with a degree in Chemical Engineering from the Technical University, Budapest, Hungary in 1969 and was awarded his PhD in 1972 for research in Alkaloid Chemistry. In 1994 he was awarded a DSc for his work on drug delivery. He is an elected RACI Fellow, Fellow of the Queensland Academy of Arts and Sciences and Fellow (External) of the Hungarian Academy of Sciences. In 2009 he was awarded the Adrian Albert award for sustained and outstanding research in medicinal biochemistry. He has over 400 peer-reviewed publications, 44 patents and a strong record in research commercialization.

i.toth@uq.edu.au