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How promising is the development of a meningococcal semi-synthetic conjugate vaccine? - a case study

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Infections due to *Neisseria meningitidis* (Men) is the leading cause of bacterial meningitis with high mortality worldwide and significant epidemics in sub-Saharan Africa. Glyco-conjugate and protein based vaccines are currently available against single or combination of meningococcal serogroups. However, most of these vaccines are available at prohibitively high costs and not affordable to people in developing countries who need these vaccines the most. A significant part of the cost of conjugate vaccine production is attributed to the complex steps in production of bacterial capsular polysaccharide (MenPS) and its conjugation to the carrier protein. We have explored an alternative approach to the development of meningococcal conjugate vaccines by organic synthesis of the oligomers of MenPS repeating units for serogroup C, Y, W and X. The synthetic oligomers of serogroup C (sMenC) and X (sMenX) were used for conjugation to tetanus toxoid (TT) by a simple chemistry through an in-built linker. The sMenC-TT conjugates when tested for immunogenicity in the mouse model, were found to elicit IgG and functional antibody titers comparable or better than those elicited by a licensed vaccine. The sMenX-TT conjugate also gave rise to more than 10 fold antibody titers as compared to the vehicle control. The results point to the possibility of developing an affordable semi-synthetic multi-valent meningococcal conjugate vaccine. The simplicity of manufacturing requirements, in-built linker, common conjugation chemistry for all serogroups, least loss of epitopes, high yields and highly defined oligomers/conjugates make the semi-synthetic conjugate vaccine platform an attractive option for use in the developing world.

Biography

Dr. Manoj Kumar, Ph.D. (Bacteriology), presently working as Associate Director, R&D at MSD Wellcome Trust Hilleman Labs is heading the conjugate vaccine research portfolios. In his 15 years of research career, he has worked on several vaccine, biosimilar product and diagnostics development projects. He has 9 patent applications, 11 publications, 2 book chapters, 4 popular articles, 7 gene sequences, 12 national and international awards in his name. He is a contributing scientist on revision of WHO TRS927 Annex 2 for manufacture and evaluation of pneumococcal conjugate vaccines. His focus areas include: New vaccine development; Cost effective vaccine technologies; Developing faster analytical methods, and Technology transfers.

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