Effect of N-terminal poly histidine tag on immunogenicity of *Streptococcus pneumoniae* surface protein SP0845

At DBT**'s** National Institute of Immunology (NII), New Delhi, SP0845, a pneumococcal surface protein and a potential candidate vaccine for *Streptococcus pneumoniae* infection, was used to evaluate the role of hexa-histidine affinity tag on its biophysical properties and immunogenicity. The protein was expressed in *E. coli* with and without histidine affinity tag and purified to homogeneity. Size exclusion chromatographic studies revealed that tag free SP0845 was mainly monomeric in solution whereas, histidine tagged SP0845 stayed predominantly in an oligomeric form. Histidine-tagged SP0845 have higher β sheet content than the tag free protein. Removal of histidine tag increased the α-helical content of SP0845 from 35% to 46%. Histidine tagged SP0845 elicited higher serum antibody titer in comparison to the tag free SP0845 in mice.

Effect of alum in improving the immunogenicity of tagged SP0845 was low in comparison to that observed with tag free protein. Polymeric nanoparticles are biodegradable, biocompatible and FDA approved for human use. These polymer particles provide adjuvant activity and thereby improve the immunogenicity of the antigen. Thus, use of PLA particle based delivery system will be an ideal strategy to improve the immunogenicity of tag free recombinant protein. Immunogenicity of tag free SP0845 was enhanced by delivering it using polylactide polymeric particles. Immunization using PLA particles elicited sustained antibody titers from a single dose immunization.

The present study highlights the detrimental effects of histidine tag for ease of purification. N-terminal histidine tag induced changes in oligomeric status of SP0845 which subsequently affected its immunogenicity. The presence of histidine tag thus influences the secondary structure and immunogenicity of protein and need careful consideration before use. Polymeric particles can be used to improve the immunogenicity of poorly immunogenic protein such as that devoid of any tag.

Link: https://www.researchgate.net/publication/342884587_Effect_of_N-terminal_poly_histidine-tag_on_immunogenicity_of_Streptococcus_pneumoniae_surface_protein_SP0845

Contact details:
Dr. Amulya K. Panda,
E-mail: amulya@nii.ac.in