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Candidate subunit vaccine against *S. typhi* infection

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Typhoid is a major health problem in developing countries and its management is becoming increasingly difficult due to emergence of MDR strains of *Salmonella typhi*. Currently available vaccines against typhoid have certain drawbacks including some unacceptable side effects. The search for new candidates for vaccine development is one of the high priority areas. We have identified of a highly immunogenic protein from the outer membranes of *S. typhi* that has strong potential for the development of a subunit vaccine against typhoid. The protein evokes both humoral and cell mediated immune response and protects the immunized animals against challenge with high doses of bacteria. The clearance of bacteria from the reticulo-endothelial system is accelerated; both the phagocytic index and phagocytic capacity of immunized animals are increased, the DTH response is enhanced and an increase in proliferation of PCMBs is seen. The $CD3^+$ and $CD4^+$ T-cells are significantly proliferated while the effect on $CD12^+$ cells is minimal. The protein strongly cross-reacts with the sera of typhoid patients, suggesting its possible role in evoking immune response during natural S. typhi infection. This is a novel protein which was unidentified so far having no significant homology with any of the known Salmonella proteins. Its gene has been cloned and high level expression has been achieved in E. coli. The r-protein evokes same degree of immune responses and confers similar protection as the natural protein. Further, no cytotoxicity or any adverse reaction of immunization with this protein has been seen in animals. The structure of protein has been deduced by in silico analysis and its immunogenic epitopes have been mapped. Peptides representing some of these epitopes have been synthesized to assess the immunogenicity of individual epitopes. However, the complete protein is more protective than individual epitopes. The protein has been conjugated with other S. typhi antigens and also with approved adjuvants to formulate a candidate vaccine suitable for human use. Our results show that some of the adjuvants increase its immunogenicity further. *(Supported by research grant from DST to SKJ, J.Kaur was an ICMR Senior Research Fellow. Contributions made by T. Hamid and N. Hamid are gratefully acknowledged)*

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Plant virus expression vectors for biopharmaceutical production

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Plant made biologics have elicited much attention over recent years for their potential in assisting those in developing countries who have poor access to modern medicine. Additional applications such as the stockpiling of vaccines against pandemic infectious diseases or potential biological warfare agents are also under investigation. Plant virus expression vectors represent a technology that enables high levels of pharmaceutical proteins to be produced in a very short period of time. Recent advances in research and development have brought about the generation of superior virus expression systems which can be readily delivered to the host plant in a manner that is both efficient and cost effective. The following presentation describes recent innovations in plant virus expression systems and their uses for producing biologics from plants.

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