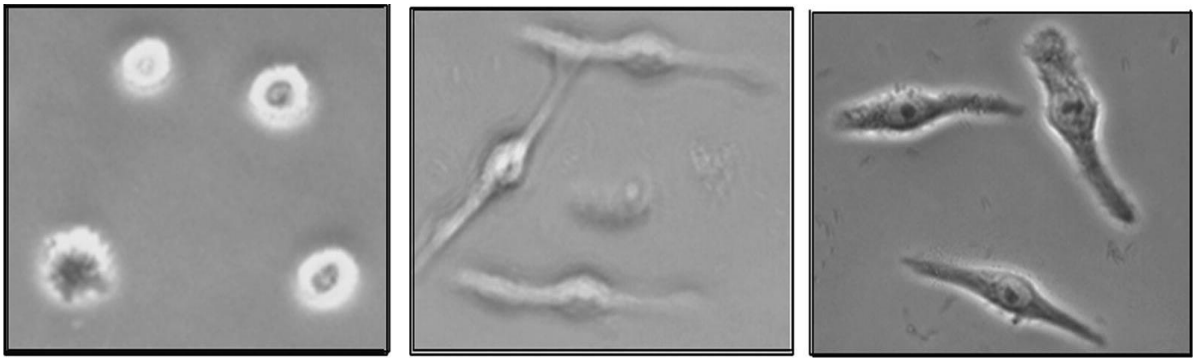
Patent granted to DBT-NII on vaccine against epsilon toxin of *Clostridium perfringens*

At DBT's National Institute of Immunology (NII), New Delhi, to meet this requirement of epitope based vaccine, the patent invention (Indian patent no 341670) identified the putative epitopes on the antigenic protein and synthesis of short oligonucleotides corresponding to these epitopes. This invetion which has been developed at NII, New Delhi relates to the generation of a recombinant fusion protein comprising of epitopes from epsilon toxin and B subunit of heat labile enterotoxin (LTB) to make a subunit vaccine for *Clostridium perfringens* epsilon toxin. Subunit vaccine contains only the small domains of the epsilon toxin thereby abolishing the toxic effect of the toxin.



Various studies have suggested that the subunit vaccines elicit more potent antigen-specific response when using in combination with an adjuvant. Heat labile enterotoxin subunit B (LTB) of *E. coli* is known to be highly immunogenic and have been widely tested as oral immunogen and as immunogenic carriers of other antigens. Binding to receptors on mucosal epithelial cells, specifically microfold cells (M-cells) located above the Peyer's patch in the intestine, is thought to increase the uptake of the antigen across the mucosa and leads to an enhanced presentation of the antigen to the immune system.

Therefore, it may be of great interest that LTB fused epsilon toxin epitope/epitopes could generate strong protective immune. Fusion protein approach offers a novel, potentially inexpensive and versatile method to produce candidate subunit vaccine. Recombinant DNA techniques are valuable tools to make fusion proteins in bulk using bacterial expression system. Existing vaccine approaches do not direct the immunity towards the epitope that will certainly give the maximum protection. This problem could be circumvented if the epitopes

of epsilon toxin gene that stimulate a protective immune response are identified and the knowledge could thus be used to design epitope-based vaccine.

C. perfringens is a Gram positive anaerobe which is ubiquitous in the environment and is capable of forming heat resistant endospores. It is a causative agent of severe gastrointestinal diseases including enterotoxemia and enteritis in animals, and gas gangrene and food poisoning in humans. *C. perfringens* has been classified into five types (A to E) based upon the toxins they produce. *C. perfringens* type B and D produce Epsilon (£) toxin and type D isolates are the etiological agents of highly lethal enterotoxaemia, particularly in sheep and goats.

Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6626085/

Contact:
Dr. Lalit C. Garg
E-mail: lalit@nii.ac.in