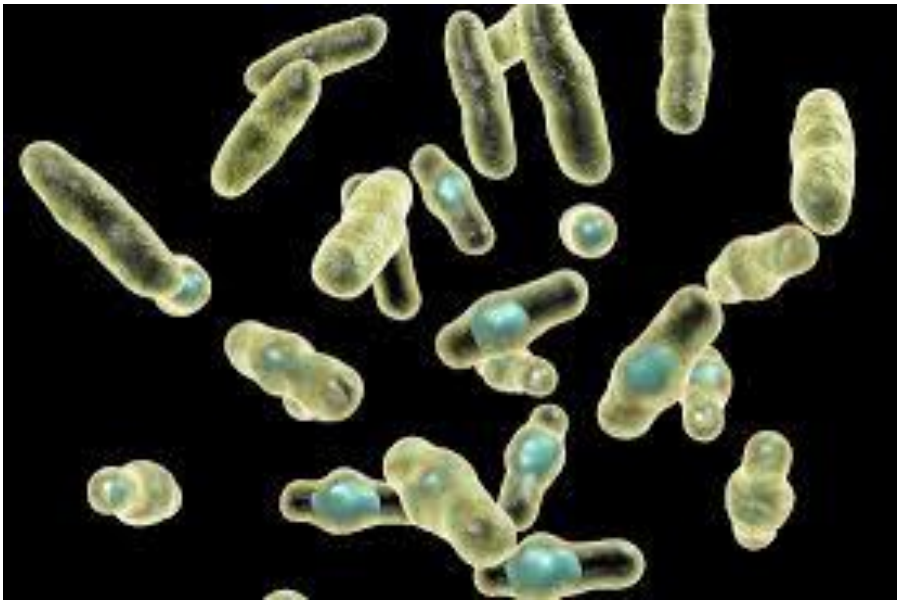
NII wins patent on vaccine against ε-toxin of *Clostridium perfringens*

DNA vaccines can theoretically result in more long-term production of an antigenic protein when introduced into a relatively non dividing tissue, such as muscle. In addition, DNA vaccine is relatively inexpensive and easy to produce than conventional vaccines. With high copy origin of replication, good yield of plasmid DNA can be purified from bacteria and suspended in a saline solution prepared for delivery which may enable timely immunization against emerging infectious diseases.



Other advantages of DNA vaccine is that its design and modification is easy, it takes less time for production and formulation and more temperature stable than conventional vaccines. It has long shelf life and likely does not require cold chain. Notably, DNA vaccine vectors do not have a eukaryotic origin of replication which prevents replication within the host cell and prevent integration into chromosomal DNA. Other potential advantages of DNA vaccine over usual approaches include no threat of reversion to the pathogenic state. DNA vaccine represents an attractive approach against infectious diseases including design, stability, cost-effectiveness and safety. But, a major challenge for effective DNA vaccine development is the development of vaccines which are capable of generating cellular immune responses. Particularly this invention provides membrane bound eukaryotic expression of epsilon toxin gene sequence and their use in effective vaccine compositions.

Clostridium perfringens is a gram-positive, rod-shaped, anaerobic, spore-forming bacterium of the genus Clostridium. The genus Clostridium includes nearly 120-160 species of spore-

forming obligatory anaerobic bacilli that usually stain gram positive. *C. perfringens* is a natural inhabitant of human and animal gastrointestinal tract and is commonly found in the soil. Epsilon-toxin (Etx) produced from type B and D cause a variety of diseases such as sudden death syndrome known as enterotoxemia or pulpy kidney disease. The ε-toxin, after tetanus and botulinum toxins, is most potent toxin produced by clostridia. The toxin is produced as an inactive prototoxin and is activated by proteolysis in the gastrointestinal tract.

At DBT's National Institute of Immunology (NII), New Delhi scientists have invented (Indian patent no. 339506) a recombinant DNA for use in vaccine which is capable of inducing protective antibodies against ε (epsilon) toxin (Etx) of *Clostridium perfringens*, when administered to animal. It provides protection against the infection of *C. perfringens* Etx.

Link: Deshmukh SK, Kaushik H, Sharma N, Tiwari S, Trivedi P ,Garg LC (2020) Development of membrane bound expression based DNA vaccine against e-toxin of *Clostridium perfringens.* (Indian patent no. 339506 granted on 26.06.2020)

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