

NII bags a patent on development of vaccine against epsilon toxin of *Clostridium perfringens*

Scientists at National Institute of Immunology (NII), New Delhi have developed a peptide based vaccine against *Clostridium perfringens* epsilon toxin that causes lethal enterotoxaemia in cattle. Recently on 28 February 2020, the scientific findings have bagged NII an Indian patent (Patent no. 333416) on “*Development of vaccine against epsilon toxin of Clostridium perfringens using peptides corresponding to immunodominant epitopes of epsilon toxin*”.

NII have established that immunization with immunodominant epitopes of epsilon toxin conjugated with tetanus toxoid brings out an effective immune response capable of neutralizing the epsilon toxin toxicity, and thereby demonstrated the potential of this tetanus toxoid-peptide conjugate as a candidate vaccine against *C. perfringens* epsilon toxin.

The NII has been working in the area of health sciences since long. Use of licensed peptide vaccines has become an interesting approach for vaccination against human diseases. At NII, the immunodominant epitopes were selected on the basis of epitope mapping by making overlapping peptides of 15 amino acid residues specific to the primary amino acid sequence of epsilon toxin which reacted strongly to the antibody against the full length epsilon toxin. Four selected peptides were chemically synthesized and chemically conjugated to partially reduced tetanus toxoid. Immunization of mice with tetanus toxoid-peptide conjugates mounted very high immune response. Analysis of the sera from mice immunized with different epitopes conjugated with tetanus toxoid clearly indicated the presence of toxin-neutralizing antibodies *in vitro*. The toxic effect of epsilon toxin in Marine Derby Canine Kidney (MDCK) cells were completely negated when the toxin was pre-incubated with the anti-sera from the vaccinated mice.

Bacteria of *Clostridium* genus are pathogenic and cause disease both in humans and animals. *C. perfringens* are typed based on the toxins they produce and different diseases caused by such toxins. *C. perfringens* type D produces epsilon toxin that cause enteric diseases in domestic animals. Epsilon toxin is the 3rd most toxic toxin produced by this bacterium and causes lethal enterotoxaemia particularly in sheep and goats, causing significant loss to farmers and animal industry. The disease progresses rapidly and the animals die shortly after

appearance of symptoms. This makes treatment with antibiotic ineffective. Therefore, vaccination remains the most effective tool to control the disease.

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