

FUNDING PROGRAM FOR NEXT GENERATION WORLD-LEADING RESEARCHERS

Project Title: Analysis of mechanism of absorption of botulinum toxin complex and its application in mucosal delivery systems

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1. Background of research

Food-borne botulism caused by botulinum toxin is a serious disease with high mortality. Indeed, in Japan in 1984, more than ten people died due to botulism food poisoning in a karashi-renkon (mustard-stuffed lotus root) incident occurred. Additionally, botulism food poisoning is very common in developing countries. Since botulinum toxin can be used to make bioterrorism weapons, anti-bioterrorism measures are being developed in Europe and the United States. However, the pathway by which botulinum toxin enters the gastrointestinal tract into the body, which determines the onset of botulism food poisoning, has not yet been characterized.

2. Research objectives

(1) To elucidate the detailed mechanism by which botulinum toxin enters the body by breaking the barrier of the gastrointestinal tract mucosa. (2) To develop safe, effective, simple, and injection-free vaccines by applying this entry mechanism, with the goal of treating various infectious diseases.

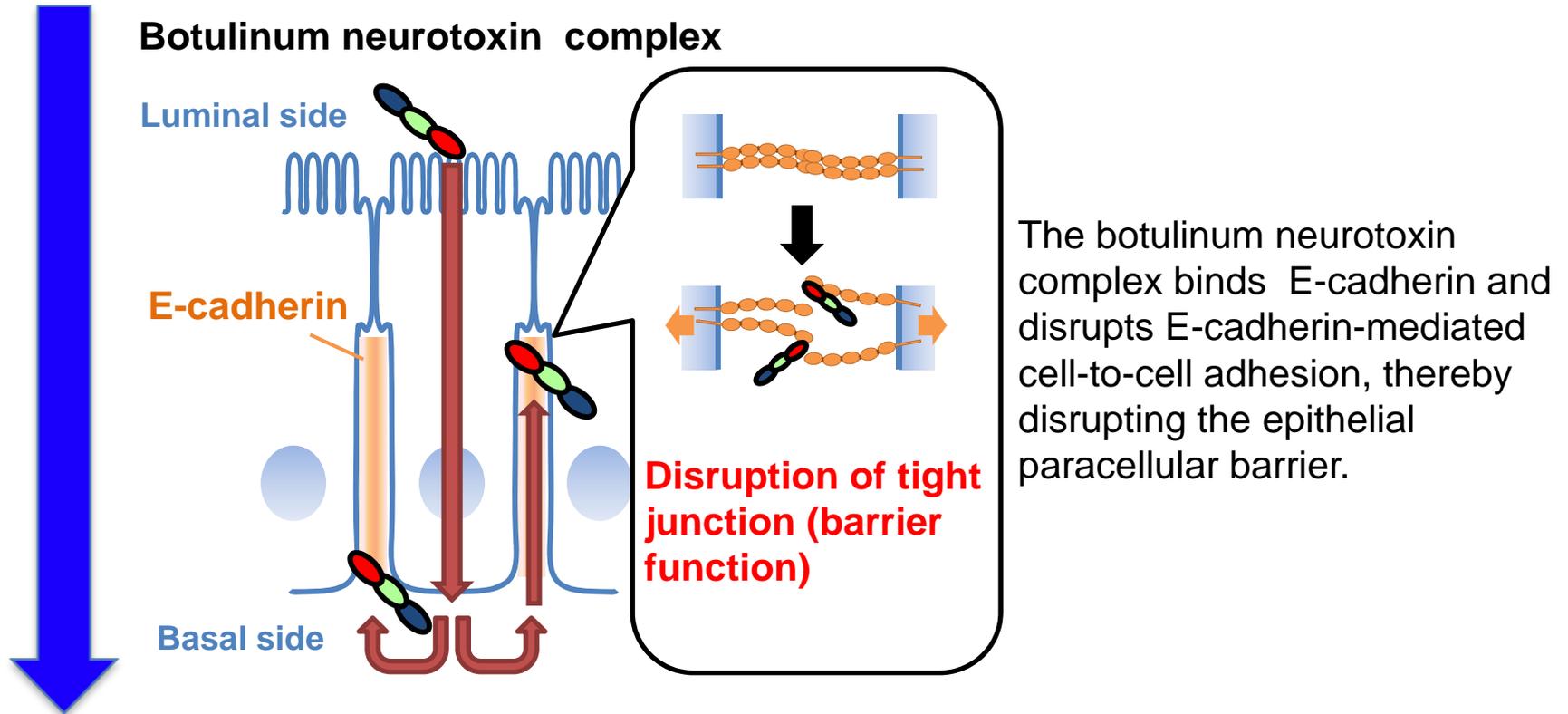
3. Research characteristics (incl. originality and creativity)

We were the first to show that the botulinum toxin utilizes a specific mechanism in order to break the mucosal barrier. Our research aims to elucidate, for the first time, the details of this mechanism. We also apply our knowledge about the mechanism of botulinum toxin entry to the development of a new vaccine system, a technological advance that has been eagerly anticipated, and for which there is great demand around the world.

4. Anticipated effects and future applications of research

Large-scale food poisoning is difficult to treat using existing therapeutic methods. We believe that our research will facilitate therapies that can block the entry of toxin into the body; this will enable people to protect themselves against widespread food poisoning, potentially saving many lives. Moreover, our research will lead to the development of a novel vaccine system to prevent various infectious diseases, which will contribute to the improvement of public health.

Understanding the mechanisms underlying intestinal absorption of botulinum toxin complex



Anticipated effects and future applications of research

- Clarification of the pathogenic mechanism of botulism and development of new therapeutics
- Understanding the mechanisms of epithelial barrier system
- Development of a novel vaccine system