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Purifying a *Clostridium Botulinum Neurotoxin* for Therapeutic Use

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The Wisconsin Alumni Research Foundation is seeking commercial partners interested in developing preparations of *Clostridium botulinum* neurotoxin BoNT/A3 for therapeutic use. This neurotoxin can be used to treat patients who are unresponsive to the current botulinum toxin therapy used for a wide variety of medical conditions.

Overview

Clostridium botulinum produces the lethal botulinum neurotoxin (BoNT). There are several types of BoNT, and the subtype BoNT/A1 is used medically to treat muscle movement disorders and cosmetic concerns. Over the course of treatment with BoNT/A1, some patients develop neutralizing antibodies that target this neurotoxin and make treatment ineffective. Alternative neurotoxin treatments that are not affected by these antibodies are needed.

Another neurotoxin subtype produced by *C. botulinum* is BoNT/A3. This neurotoxin is not affected by the antibodies that diminish the efficacy of BoNT/A1, making it a good alternative to treat patients who have developed resistance to BoNT/A1. However, BoNT/A3 is difficult to produce due to low levels of expression, so UW-Madison researchers developed a new method of preparing highly pure BoNT/A3.

The Invention

UW-Madison researchers have developed methods for preparing BoNT/A3, achieving a >90% pure toxin preparation. In addition, they developed methods for the therapeutic use of BoNT/A3 using toxin preparations that are at least 90% pure. BoNT/A3 is not impacted by antibodies active against BoNT/A1. The toxin can be used as a therapy for a wide variety of conditions that are typically treated by BoNT/A1, including headache disorders, muscle spasms and cosmetic issues, among others. This highly pure preparation of BoNT/A3 could serve as a potential treatment option for those patients who develop antibodies against BoNT/A1.

Applications

- Prospective treatment alternative for patients who develop resistance to current BoNT therapies
- Can be developed for cosmetic use and for treatment of numerous medical conditions

Key Benefits

- Limited alternatives currently exist for patients who are unresponsive to BoNT/A1
- Provides a new method for achieving a high-purity preparation of a neurotoxin with low levels of production

Stage of Development

The development of this technology was supported by WARF Accelerator. WARF Accelerator selects WARF's most commercially promising technologies and provides expert assistance and funding to enable achievement of commercially significant milestones.

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The researchers have demonstrated that they can obtain highly pure preparations of BoNT/A3. They have shown that this neurotoxin is not neutralized by anti-BoNT/A1 antibodies, making this an option for treatment of patients who develop these antibodies.

Additional Information

For More Information About the Inventors

- Eric Johnson

Publications

- Tepp WH, Lin G, Johnson EA. Purification and characterization of a novel subtype a3 botulinum neurotoxin. Appl Environ Microbiol. 2012 May;78(9):3108-13. doi: 10.1128/AEM.07967-11. Epub 2012 Feb 24. PMID: 22367089; PMCID: PMC3346436.

Tech Fields

- Therapeutics & Vaccines : CNS

For current licensing status, please contact Andy DeTienne at adetienne@warf.org or 608-960-9857