Innovations
UNIVERSITY OF COLORADO
ANSCHUTZ MEDICAL CAMPUS

Light Activated Botulinum Toxin

Product

Modified Botulinum toxin

Indication

Nonsurgical cosmetic procedures

Value Propositions

- Fine-tuned toxin delivery
- Activated by light
- Reduced number of safeguards necessary

Market

- $4.5 billion—Global botulinum toxin market (8.3% CAGR 2018-2026)

Intellectual Property

- US & European national stage patent applications*
- Available for Exclusive & Non-Exclusive Licensing

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Background on CU4572H

In 2017, Botulinum toxin (BoNT) injections were the top nonsurgical cosmetic procedure in the US with more than 1.5 million doses administered. Though it has multiple clinical uses, BoNT can have off-target effects, highlighting the benefits of a system that permits fine-tuned delivery. Furthermore, it is one of the most lethal substances available and a single gram, if evenly dispersed, could kill more than 1 million people. Because of its potent toxicity, manufacturing BoNT requires a dedicated facility with a high level of security and the most stringent pharmaceutical standards in the industry. Production of BoNT is also expensive, not only because of strict regulations that ensure safety, but also because BoNT can pose a risk to national security risk so comprehensive security measures must be in place.

Technical Innovation

A University of Colorado research team has developed two modified versions of BoNT to address delivery and production concerns. The first version is a BoNT serotype B (BoNT/B) catalytic domain that is activated by blue light. The active part of the toxin, the light chain, was engineered into two fragments which were fused to CRY2 and CIB1, photodimerizing proteins that associate upon light application. Mutations were included in the engineered version that weakened the interface between the two fragments so that they would not associate without light. The inventors showed that when exposed to light, the modified version of BoNT could be activated in neurons and was able to cleave vesicle-associated membrane protein 2 (VAMP2), as shown in Figure 1. In a second invention, the same team developed split fragments of BoNT/B and BoNT/A catalytic domains that can be expressed separately, but reconstitute together when mixed. Because the individual fragments are not toxic on their own, they can be generated in factories under less stringent safety measures than currently utilized, then mixed together by the end user to generate the holotoxin.

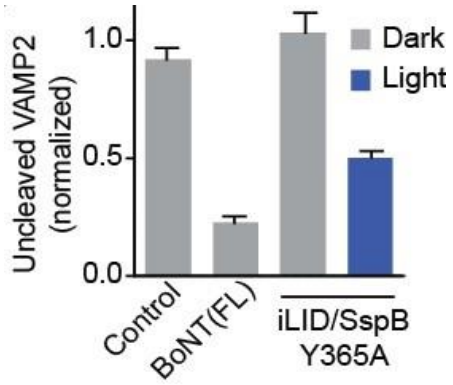

Figure: Light exposure activates modified BoNT (iLID/SspB Y365A) in cell culture as measured by VAMP2 cleavage. The antibody used recognizes full length VAMP2, so cleavage is represented by a loss of staining.

***PCT pending:** PCT/US2019/062620—"Proteins for blocking neurotransmitter release"—Filed May 20th, 2021*