CLAIMS

1. An isolated BoNT polypeptide, comprising an amino acid sequence that has at least 85%, at least 86%, at least 87%, at least 88%, at least 89%, at least 90%, at least 91%, at least 92%, at least 93%, at least 94%, at least 95%, at least 96%, at least 97%, at least 98%, at least 99%, or at least 99.5% identity to any one of SEQ ID NOs: 1-3, wherein the isolated BoNT polypeptide does not comprise the amino acid sequence of any one of SEQ ID NOs: 1-3.

2. A modified Clostridial Botulinum neurotoxin (BoNT) polypeptide, comprising one or more substitution mutation(s) in a position corresponding to C461, C467, or C1240 of SEQ ID NO: 1.

3. A modified Clostridial Botulinum neurotoxin (BoNT) polypeptide, comprising a single substitution mutation in a position corresponding to C461 or C467 of SEQ ID NO: 2.

4. A modified Clostridial Botulinum neurotoxin (BoNT) polypeptide comprising:

(a) a protease domain;

(b) a modified linker region; and

(c) a translocation domain; wherein (a), (b), and (c) are from BoNT serotype X, and wherein the modified linker region comprises one single substitution mutation in a position corresponding to C461 or C467 of SEQ ID NO: 1.

5. The modified BoNT polypeptide of claim 4, further comprising: (d) a receptor binding domain.

6. The modified BoNT polypeptide of claim 5, wherein the receptor binding domain is from BoNT/X.

7. The modified BoNT polypeptide of claim 6, wherein the receptor binding domain comprises a substitution mutation corresponding to C1240S or C1240A in SEQ ID NO: 1.

8. The modified BoNT polypeptide of claim 5, wherein the receptor binding domain is from serotype selected from the group consisting of A, B, C, D, E, F, and G.

9. The modified BoNT polypeptide of claim 4, wherein the modified linker region comprises an artificial linker.

10. The modified BoNT polypeptide of claim 9, wherein the artificial linker comprises a cleavage site of a protease.

11. A modified Clostridial Botulinum neurotoxin (BoNT) polypeptide, comprising one or more substitution mutation(s) in a position corresponding to R360, Y363, H227, E228, or H231 in SEQ ID NO: 1.

12. A modified Clostridial Botulinum neurotoxin, serotype X (BoNT/X) polypeptide comprising:

(a) an inactive protease domain;

(b) a linker region; and

(c) a translocation domain.

13. The modified BoNT/X polypeptide of claim 12, wherein the modified BoNT/X further comprises a receptor binding domain.

14. The modified BoNT/X polypeptide of claim 12, wherein the inactive protease domain comprises one or more substitution mutation(s) in a position corresponding to R360, Y363, H227, E228, or H231 of SEQ ID NO: 1.

15. An isolated BoNT/X comprising a light chain and a heavy chain,

wherein the LC comprises the amino acid sequence of SEQ ID NO: 3;

wherein the heavy chain comprises an amino acid sequence set forth as amino acids 468-1306 of SEQ ID NO: 1;

and wherein the light chain and heavy chain is connected via an inter-chain disulfide bond.