

What is claimed is:

1. An isolated peptide comprising the amino acid sequence of SEQ ID NO: 1,

(SEQ ID NO: 1)
X1 X2 R I D X3 A N Q R A T X4 X5

wherein each of X1 through X5 is chosen from the following:

X1 is K, R, ornithine, or 2, 4-diaminobutanoic acid (dbu);

X2 is V, 2-aminobutanoic acid (B), I, L, or T;

X3 is Q, A, norvaline (nV), B, or E;

X4 is K, R, or dbu; and

X5 is M or norleucine (nL);

except wherein X1=K, X2=T, X3=E, X4=K, and X5=M;

X1=K, X2=T, X3=Q, X4=K, and X5=M; or

X1=R, X2=T, X3=Q, X4=R, and X5=M.

2. The isolated peptide of claim 1, wherein the isolated peptide is modified with a fluorophore located on one side of a BoNT A cleavage site and a quencher located on the other side of the BoNT A cleavage site.

3. The isolated peptide of claim 1, comprising the amino acid sequence

(SEQ ID NO: 2)
R V R I D A A N Q R A T R M

4. The isolated peptide of claim 3, wherein the isolated peptide is modified with a fluorophore located on one side of a BoNT A cleavage site and a quencher located on the other side of the BoNT A cleavage site.

5. The isolated peptide of claim 4, wherein the fluorophore is located at one terminus and a quencher is located at the other terminus.

6. The isolated peptide of claim 5, wherein DabcyIK is located at the N-terminus and S-fluoroceinyl cysteine is located at the C-terminus.

7. The isolated peptide of claim 1, comprising the amino acid sequence

(SEQ ID NO: 3)
R V R I D A A N Q R A T R nL

8. The isolated peptide of claim 7, wherein the isolated peptide is modified with a fluorophore located on one side of a BoNT A cleavage site and a quencher located on the other side of the BoNT A cleavage site.

9. The isolated peptide of claim 8, wherein the fluorophore is located at one terminus and a quencher is located at the other terminus.

10. The isolated peptide of claim 9, wherein DabcyIK is located at the N-terminus and S-fluoroceinyl cysteine is located at the C-terminus.

11. A kit to detect the presence of BoNT A in a sample comprising

the isolated peptide of claim 2;

polymeric beads coated with antibodies specific for BoNT A; and

polymeric beads coated with immunoglobulins not specific for BoNT A.

12. The kit of claim 11, further comprising lyophilized BoNT A Lc.

13. The kit of claim 11, further comprising a pH-buffering compound in a first container.

14. The kit of claim 13, wherein the pH-buffering compound is selected from the group consisting of sodium hydroxyethylpiperazine sulfonate (HEPES) and sodium phosphate.

15. The kit of claim 13, wherein the pH-buffering compound is in dry form.

16. The kit of claim 11, further comprising bovine serum albumin.

17. The kit of claim 11, further comprising polysorbate 20.

18. The kit of claim 17, wherein the polysorbate 20 is added to a final concentration of 0.05-0.10% (v/v).

19. The kit of claim 11, further comprising a reducing agent in a first container.

20. The kit of claim 19, wherein the reducing agent is selected from the group consisting of dithiothreitol and tris(carboxyethyl)-phosphine.

21. The kit of claim 11, further comprising a zinc salt in a first container.

22. The kit of claim 21, wherein the zinc salt is selected from the group consisting of zinc chloride and zinc acetate.

23. The kit of claim 11, further comprising purified water in a second container.

24. The kit of claim 11, further comprising purified dimethylsulfoxide in a third container.

25. The kit of claim 11, wherein the lyophilized BoNT A Lc comprises a stabilizing excipient.

26. The kit of claim 11, wherein the isolated peptide comprises the amino acid sequence of SEQ ID NO: 1,

(SEQ ID NO: 1)
X1 X2 R I D X3 A N Q R A T X4 X5

wherein each of X1 through X5 is chosen from the following:

X1 is K, R, ornithine, or 2, 4-diaminobutanoic acid (dbu);

X2 is V, 2-aminobutanoic acid (B), I, L, or T;

X3 is Q, A, norvaline (nV), B, or E;

X4 is K, R, or dbu; and

X5 is M or norleucine (nL);

except wherein X1=K, X2=T, X3=E, X4=K, and X5=M;

X1=K, X2=T, X3=Q, X4=K, and X5=M; or

X1=R, X2=T, X3=Q, X4=R, and X5=M is in dry form.

27. A method of detecting the presence of BoNT A in a sample comprising

placing the sample in solution in a pH-buffering compound;

mixing the sample in the pH-buffering compound with polymeric beads coated with antibodies specific for BoNT A to provide a test assay;

mixing the sample in the pH-buffering compound with polymeric beads with immunoglobulins not specific for BoNT A to provide a control assay;

incubating the sample with the pH-buffering compound with polymeric beads coated with antibodies specific for BoNT A to provide a test assay;

incubating the sample with the pH-buffering compound with polymeric beads with immunoglobulins not specific for BoNT A to provide a control assay;

washing the polymeric beads coated with antibodies specific for BoNT A with the pH-buffering compound;

washing the polymeric beads without antibodies with the pH-buffering compound;