CLAIMS

1. A botulinum neurotoxin (BoNT) Heavy Chain Binding domain (H_C/TAB) having a N- terminal end (HCN) and a C-terminal end (HCC), wherein the HC/TAB comprises:

a) a synaptotagmin (Syt) receptor binding site, and

b) a synaptic associated vesicle 2 (SV2) receptor binding site, and

c) a ganglioside (Gang) receptor binding site,

wherein the HC/TAB has an amino acid sequence comprising any one of the sequences of SEQ. ID. Nos. 1, 6, 8, and 10,

and wherein said HC/TAB is adapted to synergistically bind to a synaptotagmin (Syt) receptor, a synaptic associated vesicle 2 (SV2) receptor and a ganglioside (Gang) receptor.

2. The HC/TAB according to claim 1, wherein the Gang receptor binding site comprises any Gang receptor binding BoNT serotype and/or their subtypes.

3. The HC/TAB according to any of claims 1 or 2, wherein the Syt receptor binding site comprises any Syt receptor binding BoNT serotype and/or their subtypes.

4. The HC/TAB according to any of claims 1-3, wherein the SV2-receptor binding site comprises any SV2 receptor binding BoNT serotype and/or their subtypes.

5. The HC/TAB according to any of claims 1-4, wherein the HCN comprises any SV2 receptor binding BoNT serotype and/or their subtypes.

6. The HC/TAB according to any of the claims 1-5, characterized in that the HCC domain is composed interchangeably of sequences from BoNT serotype A (BoNT/A) and BoNT serotype B (BoNT/B).

7. The HC/TAB according to any of the claims 1-6, characterized in that said HCC end is composed according to a sequence A1B1A2B2A3, wherein A indicates a sequence from BoNT/A and B indicates a sequence from BoNT/B.

8. The HC/TAB according to any of claims 1-7, having an amino acid sequence of SEQ. ID. No. 1.

9. A polypeptide comprising the HC/TAB according to any of the claims 1-8, coupled to any one or more other protein, polypeptide, amino acid sequence or fluorescent probe, directly or via a linker.

10. The polypeptide according to claim 9, wherein said polypeptide is a BoNT polypeptide (BoNT/TAB), characterized in that said BoNT/TAB in addition to the HC/TAB comprises a Heavy Chain Translocation domain (HN), a Light chain (LC) and a protease site positioned between the LC and HN in the polypeptide sequence, wherein the HN and the LC, respectively and independently of each other, comprises any of the BoNT serotypes A, B, C, D, DC, E, En, F, G or X and their subtypes.

11. The polypeptide according to claim 9, further comprising any other protein, polypeptide, amino acid sequence or fluorescent probe, linked thereto, directly or via a linker.

12. The polypeptide according to any of claims 9-11, having an amino acid sequence of any of SEQ. ID. No. 3, SEQ. ID. No. 5, SEQ. ID. No. 6, SEQ. ID. No. 8, SEQ. ID. No. 10 or SEQ. ID. No. 12.

13. A vector comprising a nucleic acid sequence encoding the HC/TAB according to any of the claims 1-8 or the polypeptide according to any of the claims 9-12.

14. A vector according to claim 13, comprising a nucleic acid sequence which comprises the sequence of any of SEQ. ID. No. 4, SEQ. ID. No. 7, SEQ. ID. No. 9, SEQ. ID. No. 11 or SEQ. ID. No. 13.

15. A polypeptide according to any of the claims 9-12, for use in a therapeutic method to dampen and/or inactivate muscles.

16. A polypeptide according to any of claims 9-12, for use in a cosmetic method to dampen and/or inactivate muscles.

17. Use of the polypeptide according to any of claims 9-12, in the manufacture of a medicament for the treatment and/or prevention of a neuromuscular or spastic muscle disorder.

18. The polypeptide for use according to claim 17, wherein the neuromuscular or spastic muscle disorder is chosen from the group comprising of spasmodic dysphonia, spasmodic torticollis, laryngeal dystonia, oromandibular dysphonia, lingual dystonia, cervical dystonia, focal hand dystonia, blepharospasm, strabismus, hemifacial spasm, eyelid disorder, cerebral palsy, focal spasticity and other voice disorders, spasmodic colitis, neurogenic bladder, anismus, limb spasticity, tics, tremors, bruxism, anal fissure, achalasia, dysphagia and other muscle tone disorders and other disorders characterized by involuntary movements of muscle groups, lacrimation, hyperhydrosis, excessive salivation, excessive gastrointestinal secretions, secretory disorders, pain from muscle spasms, headache pain, sports injuries, and depression.

19. A polypeptide according to any of the claims 10-12 for use in vitro as a vehicle for effectively transporting any protein, polypeptide amino acid sequence or fluorescent probe into a neuronal cytosol using a toxin translocation system.

20. A pharmaceutical or cosmetic composition comprising the HC/TAB according to any of the claims 1-8 or the polypeptide according to any of the claims 9-12.

21. A kit of parts comprising the composition of claim 20 and directions for therapeutic administration of the composition.

22. Use of the polypeptide of any of the claims 9-12, or the pharmaceutical composition of claim 20, in the manufacture of a medicament for treating a condition in a subject, wherein the condition is chosen from the group comprising of spasmodic dysphonia, spasmodic torticollis, laryngeal dystonia, oromandibular dysphonia, lingual dystonia, cervical dystonia, focal hand dystonia, blepharospasm, strabismus, hemifacial spasm, eyelid disorder, cerebral palsy, focal spasticity and other voice disorders, spasmodic colitis, neurogenic bladder, anismus, limb spasticity, tics, tremors, bruxism, anal fissure, achalasia, dysphagia and other muscle tone disorders and other disorders characterized by involuntary movements of muscle groups, lacrimation, hyperhydrosis, excessive salivation, excessive gastrointestinal secretions, secretory disorders, pain from muscle spasms, headache pain, sports injuries, and depression.

23. The polypeptide of claim 16, wherein the cosmetic method is used to treat dermatological or aesthetic/cosmetic conditions.