MOLECULAR STRUCTURE AND BIOLOGICAL ACTIVITIES OF NEUROTOXIN PRODUCED BY *CLOSTRIDIUM BOTULINUM* TYPE D STRAIN SOUTH AFRICAN

Kohji MORIISHI

Depertment of Biochemistry
Faculty of Veterinary Medicine
Hokkaido University, Sapporo 060, Japan

A neurotoxin produced by *Clostridum botulinum* type D strain South African (D-SA) was purified, and the toxin molecule consisted of single peptide chain with a molecular weight (Mr) of 140,000. Trypsinization of the toxin formed a dichain struture, which was composed of a light chain (Mr=50,000) and a heavy chain (Mr=90,000) linked by disulfide bond(s). Partial amino acid sequence analyses of the whole molecule, the heavy and the light chains revealed that the light chain region was located in the amino terminal side of the toxin molecule, and that there were sequence similarities of the light chain to those of C1 toxin and other types.

The amino acid composition and antigenicities of the whole molecules, the heavy and the light chains of type C1 and D toxins were partially similar and partially different from each other. The antigenicity of D-SA toxin light chain was similar to that of D–1873 toxin light chain. However, the antigenicity of D-SA toxin heavy chain was similar to that of C-ST toxin heavy chain. Therefore, D-SA toxin molecule is considered to be composed of D-type light chain and Cl-type heavy chain. This suggests that the detailed structures of botulinum toxins differ from each other even within the same type.

By trypsinizing the toxin molecule, the lethal activity and inhibition activity of acetylcholine release from rat synaptosomes were enhanced about 4–10 fold. Moreover, the trypsinization also increased absorbance at 235 and 278 nm. These results indicate that a conformation change of the toxin molecule causes an increase of toxin activity.