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# MOLEKULARNE PODSTAWY PATOGENNEGO DZIAŁANIA NEUROTOKSYN *CLOSTRIDIUM BOTULINUM*

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## Molecular aspects of *Clostridium botulinum* neurotoxin pathogenicity

*Abstract:* Botulinal neurotoxins produced during sporulation by *C. botulinum* in anaerobic conditions are directly causing symptoms of botulism in infants and adults. There are 7 types of such neurotoxins: BoNT/A, BoNT/B, BoNT/C1, BoNT/D, BoNT/E, BoNT/F aud BoNT/G. Phylogenetic studies specify *C. botulinum* as highly heterogenic species with a high level of phenotypic and genotypic differences. Differentiation of *C. botutinum* strains which produce neurotoxins into metabolic groups according to their ability of protein complexes restriction and culture features is still applicable. Activity of zinc-independent endoproteasis is characteristic for botulinal neurotoxins, resulting in a release of acetylocholin at synapsis inhibition and in appearance of flaccid paralysis symptoms. Purified BoNT protein is composed of toxic and nontoxic hemagglutinin components. Complex of A type neurotoxin with hemagglutinin is successfully used for therapeutic purposes in the treatment of many neuro-vascular disorders. Studies on recombinationally modified rBoNT/C protein are leading to construction of a vaccine against intoxications induced by BoNT. BoNT molecules create complexes named protoxins and their forms LL, L, and M are detected. Most of the genes encoding representative types of botulinal neurotoxins were sequenced. Genes encoding A, B, and E neurotoxins are chromosomally localized differently from genes encoding C and D toxins, which were found on the phage. There is an evidence of transfer and BoNT genes expression into strains previously defined as nontoxic. Moreover, *C. botulinum* strains producing more than one type of neurotoxin were found. The same studies showed also mosaic structures of genes encoding BoNT. Level of homology between genes of known neurotoxins in H and L chains may suggest that during

evolution they were distinct domains. For botulinal neurotoxins detection in addition to classical seroneutralisation test in mice performed with a patient serum, there are also used immunoenzymatic and PCR amplification techniques.

1. Introduction. 2. Taxonomy of strains produce neurotoxins. 3. Feature of botulinal neurotoxins. 4. Genetic basis of neurotoxicity. 5. Mosaic structure of botulinal neurotoxin. 6. Homology between botulinal neurotoxins. 7. Detection of botulinal neurotoxins. 8. Epidemiology of *C. botulinum* strains. 9. Botulinal neurotoxins in medical practice. 10. Botulinal neurotoxin as a potential vaccine antigen. 11. Summary