



toxins



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Clinical Applications and Diversity of Botulinum Toxins

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Message from the Guest Editor

Botulinum neurotoxins (BoNTs) are produced by Gram-positive, anaerobic and spore-forming bacteria belonging to the genus *Clostridium* (*Clostridium botulinum*, *C. butyricum*, *C. baratii* and *C. argentinense* spp), with high immunological and genetic diversity. BoNTs are divided into nine toxinotypes (A, B, C, D, E, F, G, H or F/A, X) based on serological methods using specific antisera or, more recently, using genome sequencing for BoNT/X. To add further complexity, each toxinotype is subdivided into subtypes based on amino acid variations, leading to the identification of 41 subtypes so far. BoNTs are classified as the most harmful biological weapons due to their extreme potency. At the same time, BoNTs are widely used in therapy for an increasing number of applications. Enhancing our understanding of the activity of the BoNT variants, as well as the development of BoNT-based engineered proteins, opens the door to novel applications. Moreover, there is a pressing need to optimize the current detection methods challenged by BoNT diversity. This review will focus on BoNTs' variability and the opportunities or challenges posed for future clinical applications.



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