

Botulinum Neurotoxin Sensing in Complex Matrices

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Abstract

Botulinum neurotoxin (BoNT) is the most poisonous substance known. Recently, it has been considered as serious bioterrorism threat in foods. Rapid, specific, and sensitive detection of BoNT is a prominent strategy for deterrent of bioterrorist activity. Studies in our laboratory have emphasized the fundamental properties of BoNT, and a prominent focus has been the detection of the toxin in complex food and clinical matrices. Methods for concentration of BoNT are described, particularly by utilizing monoclonal antibodies attached to magnetic beads. Certain detection platforms are presented based on the biological properties of BoNT and engineering principles. Systems employing various detection and sensing strategies including microfluidics, liquid crystals, mass spectroscopy, and remote sensing are described. The development of these systems has provided methods for rapid and sensitive detection of BoNT that does not involve traditional animal testing.