Abstract:
Biological toxins are a large and heterogeneous group of organic compounds that share commonalities with both biological and chemical agents. Based on the availability of the source organisms, their high toxicity to humans, and the lack of medical countermeasures as well as their known history of military research, toxins like ricin, botulinum neurotoxins, staphylococcal enterotoxins, and saxitoxin are classified as toxins of potential bioterrorism risk. At the same time, some of the mentioned toxins are known as cause of naturally occurring intoxications, so their monitoring and detection is important in the health and food sector as well. Although the four toxins cause different biological effects on the human body, they share a common critical feature: they occur in many different variants or isoforms which makes their reliable and sensitive detection as well as unambiguous identification a challenging task. Different technologies for toxin detection have been established in expert laboratories ranging from rapid screening to sophisticated identification methods, but hardly any universally agreed reference or harmonized methods are available, and reference materials as well as regular proficiency tests are lacking for most of the mentioned toxins. Therefore, objective comparison of method performance as it is done with other analytes in regular interlaboratory studies has not been possible. To address this point, the recently finished EU-funded project EQuATox brought together expert laboratories from different scientific sectors to delineate the current status quo of toxin detection on the basis of a series of proficiency tests. This review provides an overview on the results obtained and highlights the needs for future developments in the field.

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Authors:
DORNER Brigitte
ZELENY Reinhard
HARJU Kirsi
HENNEKINNE Jacques-Antoine
VANNINEN Paula
SCHIMMEL Heinz
RUMMEL Andreas

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