Antibodies conjugated to magnetic beads for the clean-up and pre-concentration of ciguatoxins

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Ciguatoxins (CTXs) are lipophilic marine toxins produced by microalgae of the genera Gambierdiscus and Fukuyoa. The ingestion of fish contaminated with CTXs causes ciguatera fish poisoning (CFP), the most relevant seafood-borne disease worldwide. CFP is characterized by severe neurological, gastrointestinal and cardiovascular disorders, and affects approximately between 50,000 and 500,000 consumers annually worldwide. The cell-based assay (CBA) is commonly used for the detection of CTXs because it is highly sensitive and provides toxicological information. However, fish matrix compounds may interfere in the CBA. In this work, three different monoclonal antibodies (mAbs), two capture (3G8 and 10C9) and a detector (8H4) conjugated to magnetic beads have been evaluated as clean-up materials and, at the same time, as tools to pre-concentrate CTXs present in fish extracts prior to analysis with CBA. The applicability of the system was firstly demonstrated with fish extracts spiked with CTX congeners (CTX1B and CTX3C) and, afterwards, with extracts from naturally contaminated fish containing CTXs. The analysis of samples showed that the antibody-magnetic bead conjugates provide good toxin recoveries and allow exposing neuro-2a cells to higher fish tissue concentrations. This clean-up and pre-concentration strategy decreases the limit of detection of the CBA, which is a great achievement considering the extremely low CTX contents that need to be detected to guarantee fish safety and protect human health.

Keywords: CTXs, magnetic beads, antibodies, CBA