



Regional comparison on ciguatoxicity, hemolytic activity, and toxin profile of the dinoflagellate *Gambierdiscus* from Kiribati and Malaysia



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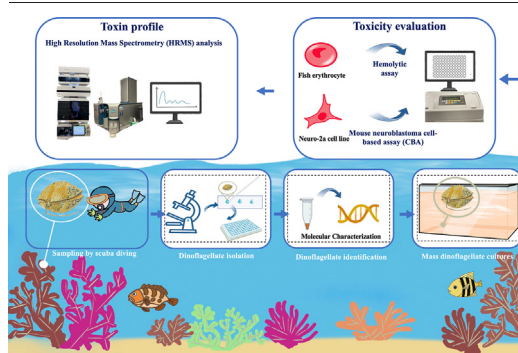
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HIGHLIGHTS

- An investigation of hydrophilic and lipophilic toxins from 19 strains of *Gambierdiscus* and a strain of *Fukuyoa* is performed.
- The analysis revealed the presence of CTX-like activity in 8 out of 20 strains.
- CTX-like activity of *G. balechii* ranged from 31.59 to 40.21 f. CTX3C eqv. cell⁻¹.
- The HRMS spectrum suggests the presence of putative 44-methylgambierone contributing to the hemolytic activity.
- Hemolysis assay can discriminate the hydrophilic CTXs precursor produced.

GRAPHICAL ABSTRACT



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ABSTRACT

The dinoflagellates *Gambierdiscus* and *Fukuyoa* can produce Ciguatoxins (CTXs) and Maitotoxins (MTXs) that lead to ciguatera poisoning (CP). The CP hotspots, however, do not directly relate to the occurrence of the ciguatoxic *Gambierdiscus* and *Fukuyoa*. Species-wide investigations often showed no association between CTX level and the molecular identity of the dinoflagellates. In the Pacific region, Kiribati is known as a CP hotspot, while Malaysia has only three CP outbreaks reported thus far. Although ciguatoxic strains of *Gambierdiscus* were isolated from both Kiribati and Malaysia, no solid evidence on the contribution of ciguatoxic strains to the incidence of CP outbreak was recorded. The present study aims to investigate the regional differences in CP risks through region-specific toxicological assessment of *Gambierdiscus* and *Fukuyoa*. A total of 19 strains of *Gambierdiscus* and a strain of *Fukuyoa* were analyzed by cytotoxicity assay of the neuro-2a cell line, hemolytic assay of fish erythrocytes, and high-resolution mass spectrometry. *Gambierdiscus* from both Kiribati and Malaysia showed detectable ciguatoxicity; however, the Kiribati strains were more hemolytic. Putative 44-methylgambierone was identified as part of the contributors to the hemolytic activity, and other unknown hydrophilic toxins produced can be potentially linked to higher CP incidence in Kiribati.

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