



**HAL**  
open science

## Assessment of saxitoxin sensitivity of nerves isolated from the Pacific oyster, *Crassostrea gigas*, exposed to *Alexandrium minutum*

Floriane Boullot, Caroline Fabioux, Helene Hegaret, Philippe Soudant, Pierre Boudry, Evelyne Benoit

### ► To cite this version:

Floriane Boullot, Caroline Fabioux, Helene Hegaret, Philippe Soudant, Pierre Boudry, et al.. Assessment of saxitoxin sensitivity of nerves isolated from the Pacific oyster, *Crassostrea gigas*, exposed to *Alexandrium minutum*. 23th Meeting on Toxinology “ Toxins: Immunity, Inflammation and Pain ” organized by the French Society of Toxinology (SFET), *Toxicon*, 149, pp.93, 2018, 10.1016/j.toxicon.2017.12.025 . hal-02334360

**HAL Id: hal-02334360**

**<https://hal.science/hal-02334360>**

Submitted on 15 Feb 2024

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

## Assessment of saxitoxin sensitivity of nerves isolated from the Pacific oyster, *Crassostrea gigas*, exposed to *Alexandrium minutum*

Floriane Boullot<sup>1</sup>, Caroline Fabioux<sup>1</sup>, H el ene H egaret<sup>1</sup>, Philippe Soudant<sup>1</sup>, Pierre Boudry<sup>2</sup>, Evelyne Benoit<sup>3</sup>

<sup>1</sup>Laboratoire des Sciences de l'Environnement Marin (LEMAR), Institut Universitaire Europ een de la Mer, Universit e de Bretagne Occidentale, UMR 6539 CNRS/UBO/IRD/Ifremer, 29280, Plouzan e, France; <sup>2</sup>Ifremer (LEMAR), UMR 6539 CNRS/UBO/IRD/Ifremer, 29280 Plouzan e, France; <sup>3</sup>DRF/iBiTec-S/SIMOPRO, CEA de Saclay, and Institut des Neurosciences Paris-Saclay (Neuro-PSI), UMR 9197 CNRS/Universit e Paris-Sud, 91190 Gif-sur-Yvette, France

Harmful algal blooms of the genus *Alexandrium*, producing paralytic shellfish toxins (PSTs), regularly occur in French coastal waters, contaminating shellfish. Among those, Pacific oysters (*Crassostrea gigas*) may accumulate high levels of PSTs during these blooms. PSTs are composed of saxitoxin (STX) and analogues which, similarly to tetrodotoxin, block voltage-gated sodium channels and thus inhibit action potentials in excitable cells. The aim of our study was to analyse the PST-sensitivity of *C. gigas* in relation to toxin bio-accumulation. For this purpose, the STX sensitivity of cerebrovisceral nerves isolated from both field and cultured oysters obtained from a shellfish farmer, experimentally exposed to *A. minutum*, was evaluated using an electrophysiological approach. Meanwhile, the PST content of their digestive gland was determined using biochemical analyses.

The compound nerve action potential (CNAP) of oysters collected in the field on April 2014 was about 5 fold more sensitive to STX than those collected on October 2015, suggesting that summer exposure to PST-producing *A. minutum* bloom potentially resulted in a decreased sensitivity to STX. Additionally, the STX-sensitivity of CNAPs recorded from cultured oysters experimentally fed with *A. minutum* (toxic-exposed oysters) or *Isochrysis sp.*, a non-toxic micro-algae, (control oysters) revealed that these oysters could be separated into two groups, "resistant" and relatively "sensitive", independently of their diet. Moreover, the percentage of toxin-"sensitive" nerves was lower and the STX concentration necessary to block 50% of their CNAP was higher in toxic-exposed than control oysters. This supports the above proposed hypothesis stating that toxic-exposed oysters are relatively more resistant to STX than non-exposed ones. However, no obvious correlation was observed between nerve sensitivity to STX and the PST content of oyster digestive gland.

In conclusion, *C. gigas* oyster nerves are shown, for the first time, to have micromolar range of STX sensitivity, which decreases when oysters are exposed to dinoflagellates producing PSTs.

**Keywords:** *Crassostrea gigas*; compound nerve action potential; *Alexandrium minutum*; paralytic shellfish toxins