

Accumulation and depuration profiles of PSP toxins in the short-necked clam *Tapes japonica* fed with the toxic dinoflagellate *Alexandrium catenella*

Mohamad Samsur^a, Yasunaga Yamaguchi^b, Takefumi Sagara^c,
Tomohiro Takatani^d, Osamu Arakawa^{d,*}, Tamao Noguchi^e

^aGraduate School of Science and Technology, Nagasaki University, Nagasaki 852-8521, Japan

^bMaruzen Pharmaceuticals Corporation Ltd., Hiroshima 729-3102, Japan

^cShikoku University Junior College, Tokushima 771-1192, Japan

^dFaculty of Fisheries, Nagasaki University, Nagasaki 852-8521, Japan

^eTokyo Health Care University, Tokyo 154-8568, Japan

Received 25 January 2006; accepted 1 June 2006

Available online 27 June 2006

Abstract

A toxic dinoflagellate responsible for paralytic shellfish poisoning (PSP), *Alexandrium catenella* (*Ac*) was fed to the short-necked clam *Tapes japonica*, and the accumulation and depuration profiles of PSP toxins were investigated by means of high-performance liquid chromatography with postcolumn fluorescence derivatization (HPLC-FLD). The short-necked clams ingested more than 99% of the *Ac* cells (4×10^7 cells) supplied once at the beginning of experiment, and accumulated a maximal amount of toxin (185 nmol/10 clams) after 12 h. The rate of toxin accumulation at that time was 23%, which rapidly decreased thereafter. Composition of the PSP toxin accumulated in the clams obviously different from that of *Ac* even 0.5 h after the cell supply, the proportion of C1 + 2 being much higher than in *Ac*, although the reason remains to be elucidated. In contrast, a higher ratio of gonyautoxin (GTX)1 + 4 than in *Ac* was detected in the toxin profiles of clam excrements. The variation in toxin composition derived presumably from the transformation of toxin analogues in clams was observed from 0.5 h, such as reversal of the ratio of C1 to C2, and appearance of carbamate (saxitoxin (STX), neoSTX and GTX2, 3) and decarbamoyl (dc) derivatives (dcSTX and dcGTX2, 3), which were undetectable in *Ac* cells. The total amount of toxin distributed over *Ac* cells, clams and their excrements gradually declined, and only 1% of supplied toxin was detected at the end of experiment.

© 2006 Elsevier Ltd. All rights reserved.

Keywords: *Tapes japonica*; *Alexandrium catenella*; Paralytic shellfish poisoning (PSP); Toxin accumulation

1. Introduction

Intoxication of filter-feeding bivalves during blooms of toxic dinoflagellates responsible for

paralytic shellfish poisoning (PSP) has become a global concern in recent decades (Hallegraeff, 1993). PSP toxins produced by dinoflagellates can be concentrated and retained in bivalve tissues, and pose a significant human health risk after consumption of the contaminated bivalves (Bricelj and Shumway, 1998). Every year, along the coastal

*Corresponding author. Fax: +81 95 819 2844.

E-mail address: arakawa@nagasaki-u.ac.jp (O. Arakawa).