

# Effect of Cholinesterases activities on tissue of manila clam, *Ruditapes philippinarum* exposed to waterborne Lead(Pb)

Mi-young Choi · Suck-woo Jang\* · Eun young Min · Kwang sub Kim ·  
Ju-chan Kang

Department of Aquatic Life Medicine, Pukyong National University  
\*Marine Environment Management Team, National Fisheries Research &  
Development Institute(NFRDI)

## Introduction

Heavy metals are among the most widespread potential chemical contaminants in the environmental (Pace and Lannucci, 1994). Above all lead(Pb) is a ubiquitous environmental and industrial pollutant that is known to induce a wide range of biochemical and physiological dysfunctions (Courtois et al., 2003). Bivalve molluscs are filter-feeding sedentary species, especially prone to the accumulation, clams are exposed to a wide variety of compounds whose effects can be interrelated (Shin et al., 2002).

Cholinesterase (ChEs) are an ubiquitous class of serine hydrolases which physiologically remove choline from the synaptic cleft. ChEs have been divided in two types, acetylcholinesterase (AChE), butyrylcholinesterase (BChE) or propionylthiocholinesterase (PChE). In this study, we analyzed the neurotoxic effects of waterborne Pb exposure on ChEs activities in digestive gland and gills in Manila clam, *R. philippinarum*.

## Materials and Methods

Manila clam (length  $32.9 \pm 2.4$  mm, weight  $8.1 \pm 1.7$ g) were collected a clam farm in Goheung country Geonnam, Korea. The animals in the test tank were exposed to the different concentrations from 0, 15, 30, 150, 300  $\mu\text{g/L}$  of lead nitrate under sub-lethal concentration for 2 weeks after that were cleaned sea water for 1 week. Clams were sampled every 1 week for 3 weeks from each

group. The tissues were dissected out. Then tissue homogenized in ice-cold 50 mM Tris-HCl buffer, pH 7.5 using Teflon-glass homogenizer (099C K4424, Glas-col) and homogenate was centrifuged at 9000 ×g, 4°C for 30min. The supernatant(S9) was stored at -75°C. ChEs activities were determined spectrophotometrically in S9 using ACh, BCh , PCh iodide as different substrates, the method of Ellman(1961) as modified by Galgari (1991).

The data was analyzed by ANOVA with Duncan test. The levels of significance were established at P<0.05.

## Results and Summary

The stress on lead exposure were observed every weeks. The predominant inhibitive AChE and BChE activities were observed all concentrations each digestive gland and gill in 2 week. Especially compared to the control group, a decrease in both tissue the PChE level was observed about three times in clams exposed to high dose, 300µg/L in 1 week and all concentrations in 2week. BChE and PChE levels in 3 week (1 week depuration time) were still significant decrease. This results in study have demonstrated that tissue damage to expose and eliminate of lead. A depletion as observed in result, may represent a first response to pollutants which can be followed by an induction of nervous systems (Gabryelak and Klekot, 1985). And the use of ChEs Manila clam, *R. philippinarum* in different compartment of marine coastal ecosystem, can find a useful application of marine coastal environmental monitoring tool for detecting possible, effect induced by Pb, metals on living marine organisms.

## References

- Gabryelak, T., J. klekot, 1985. The effect of paraquat on the peroxide metabolism in erythrocytes of freshwater fish species. *Comp. Biochem. Physiol.* 8C(2), 415-418.
- Pace, R. C. and E. Lannucci, 1994. The importance of vitamins in relation to the presence of metals in food. *Panminerva Med.* 36, 80-82.
- Shin, P. K. S., A. W. M. Ng, R. Y. H. Cheung, 2002. Burrowing responses of the short-neck clam *Ruditapes philippinarum* to sediment contaminants. *Marine Pollution Bulletin.* 45, 133-139.