

RESEARCH REPORT - No. 1403 FY 2014–2015

Title of research project	Studies for risk assessment of ciguatera fish poisoning
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Name of principal research Investigator (PI)	Naomasa Oshiro

【Abstract】

Ciguatera fish poisoning (CFP) is one of the most common food poisonings due to consumption of finfish contaminated with natural toxins, namely ciguatoxins (CTXs). The implicated fishes are mostly captured off the tropical and sub-tropical waters. The principal toxins, CTXs, are produced by the dinoflagellate of the genus *Gambierdiscus*. The toxins transfer from dinoflagellate to herbivorous marine animals and carnivorous fishes via food chain.

The objective of this project was to obtain necessary scientific information to perform a risk assessment of CFP. To archive the objectives of the project, we set up five sub-projects including i) Investigation of current status of CFP cases in Japan, ii) Development of CTXs detection method, iii) Investigation of the distributions of CTXs in the marine creatures of the Japanese Waters, iv) Toxicological study on CTXs, and, v) Collection and analysis of risk assessment information on CFP through the international community and countries.

We developed the CFP specific questionnaire to collect necessary information to perform a risk assessment on CFP. The questionnaire was employed by the Okinawa Prefectural Government and demonstrated to be a functional tool for collecting necessary information during investigations of CFP cases. This questionnaire should be considered as a prototype for epidemiological data collection of the food poisoning cases associated with other natural toxins.

LC-MS/MS analysis of ciguateric fish specimens collected off the Okinawan Waters achieved relationship between toxicity information such as amounts and profiles of CTXs and biological data including body length, weight, and age. The highly toxic specimens were used for isolating CTXs to be used as a standard material.

While the specimens including fishes, alga, and grazers collected from Mainland Japan were analyzed by LC-MS/MS, CTXs was not detected from any of these specimens. The fish specimens were also collected from Republic of Trinidad and Tobago, Taiwan, Thailand, Philippines, and Republic of Fiji. Among them, CTXs were detected in three specimens from Fiji, which have been known as ciguatera endemic region.

The toxicological study was also carried out. LD50 values of CTX1B and CTX3C administered via i.p. and oral route were estimated. The LD50 values of the oral route were similar to those obtained via i.p. While mice injected with lethal dose of CTX1B were dead within 24 hours. Among the mice injected with lethal dose of CTX3C, some survived for several days and died. In the case of the CTX3C, observation period of injected mice should be set more than 24 hours to avoid under estimation.

Information of risk assessment on CFP was collected from FAO, EFSA, and France. These data were limited and more data is needed to reduce uncertainty while performing risk assessment for CTXs. Using epidemiological data obtained in this project at Okinawa, the ARfD value for CTXs was estimated. In addition,

information on CTX risk management are collected from FAO, EU, US and Australia, and analyzed for the application in Japan.

During the limited 2 year time period, we obtained several scientific data which should be included in the risk assessment for CFP. And we also proposed future tasks and challenges to be solved to improve the collection of scientific information for the risk assessment on CFP. Our approaches demonstrated in this project should be applied on the future data collection for the risk assessment on other natural toxins.