Features of Ciguatera Fish Poisoning Cases in Hong Kong 2004-2007

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Objective To review the clinical features and laboratory investigations of ciguatera patients in Hong Kong between 2004 and 2007 in order to show the timely sampling of implicated fish from ciguatera victims and application of validated mouse bioassay for confirming suspected clinical cases of ciguatera. **Methods** Diagnosis of the ciguatera victims was based on history of coral fish consumption and clinical presentations stated in official guidelines for clinical diagnosis of ciguatera fish poisoning in Hong Kong. Food remnants of coral fish samples were collected swiftly from ciguatera victims between 2004 and 2007 for ciguatoxins (CTXs) analysis. **Results** Major clinical symptoms in ciguatera patients included gastrointestinal and neurological effects including limb numbness and diarrhoea, which developed at 0.5 to 15 hours after consumption of fish. In most cases, neurological symptoms were more common than gastrointestinal symptoms. A broad range of attack rate (10%-100%) was observed in each ciguatera outbreak. Validated mouse bioassay on ether extracts of the food remnant samples confirmed that all were CTXs-positive (<0.5 – 4.3 MU/20 mg ether extract) and directly linked to the corresponding ciguatera cases. **Conclusion** Consistency between clinical and laboratory analysis for ciguatera poisoning illustrates the application of laboratory mouse bioassay in a timely fashion for confirming ciguatera poisoning cases and implementing effective public health measures. With further improvement in laboratory techniques, features of ciguatera fish poisoning cases can be better defined. Further studies are needed to determine the risk of each class of CTXs (Pacific-, Indian- and Caribbean-CTXs) in Hong Kong.

Key words: Ciguatera poisoning; Ciguatoxin; Food remnants; Hong Kong; Mouse bioassay

REFERENCES

1. Lewis R J, Sellin M, Poli M A, *et al*. (1991). Purfication and characterization of ciguatoxins from moray eel (*Lycodontis javanicus*, Muraenidae). *Toxicon* **29**, 1115-1127.
2. Lehane L, Lewis R J (2000). Ciguatera: a recent advances but the risk remains. *Int J Food Microbiol* **61**, 91-125.
3. Lewis R J (2001). The changing face of ciguatera. *Toxicon* **39**, 97-106.
4. Hamilton B, Hurbungs M, Vernoux J –P, *et al*. (2002) Isolation and characterisation of Indian Ocean ciguatoxin. *Toxicon* **40**, 685-693.
5. Lu S, Hodgkiss I J (2004). Harmful algal bloom causative collected from Hong Kong waters. *Hydrobiologia* **512**, 231-238.
6. Agriculture, Fisheries and Conservation Department (AFCD) (2004). Agriculture, Fisheries and Conservation Department Annual Report 2002-2003. Government of Hong Kong Special Administrative Region.
7. Chan P (2000). The industry perspective: wholesale and retail marketing aspects of the Hong Kong live reef food fish trade. *SPC Live Reef Fish Information Bulletin* **7**, 3-7.
8. Wong C K, Hung P, Lee K L H, Kam K M (2005). Study of an outbreak of ciguatera fish poisoning in Hong Kong. *Toxicon* **46**, 563-571.
9. Lewis R J (1995). Detection of ciguatoxins and related benthic dinoflagellate toxins: *in vivo* and *in vitro* methods. In: *Manual on Harmful Marine Microalgae* (Hallegraeff G M, Anderson D M and Cembella A D, Eds.), pp. 135-161. IOC Manuals and Guides No. 33. UNESCO, France.
10. Lewis R J (2003). Detection of toxins associated with ciguatera fish poisoning. In: *Manual on Harmful Marine Microalgae* (G. M. Hallegraeff, D. M. Anderson and A. D. Cembella, Eds.), pp. 267-277. IOC Manuals and Guides No. 33. UNESCO, France.
11. Kwan L C, Cheung D K F, Kam K M (2003). Peak occurrences of ciguatera fish poisoning precede cholera outbreaks in Hong Kong. *Epidemiol Infect* **131**, 621-626.
12. Centre for Health Protection (2005). *Communicable Diseases Watch Volume 2, Number 13, Weeks 25-26 (June 12-25, 2005)*. Department of Health, Government of Hong Kong Special Administrative Region.
13. Lehane L (1999). *Ciguatera fish poisoning: a review in a risk-assessment framework*. Canberra: National Office of Animal and Plant Health, Agriculture, Fisheries and Forestry Australia.
14. Lehane L (2000). Ciguatera update. *Med J Aust* **172**, 176-179.

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CN 11-2816/Q

15. Lewis R J, Sellin M (1993). Recovery of ciguatera from fish flesh. *Toxicon* **31**, 1333-1336.
16. Habermehl G G, Krebs H C, Rasoanaivo P, *et al*. (1994). Severe ciguatera poisoning in Madagascar: a case report. *Toxicon* **32**, 1539-1542.
17. Lewis R J (2000). Ciguatera management. *SPC Live Reef Fish Information Bulletin* **7**, 11-13.
18. Pearn J (2001). Neurology of ciguatera. *J Neurol Neurosurg Psychiatry* **70**, 4-8.
19. Ting J Y S, Brown A F T, Pearn J H (1998). Ciguatera poisoning: an example of public health challenge. *Aust NZ J Publ Health* **22**, 140-142.
20. Ting J Y S, Brown A F T (2001). Ciguatera poisoning: a global issue with common management problems. *Eur J Emerg Med* **8**, 295-300.
21. Johnson E A, Schantz E J (2006). Miscellaneous natural intoxicants. In *Foodborne Infections and Intoxications* (Riemann H P and Cliver D O, Eds), pp. 663-709. Elsevier Academic Press, Amsterdam.
22. De Fouw J C, Van Egmond H P, Speijers G J A (2001). *Ciguatera fish poisoning: a review*. National Institute of Public Health and the Environment, RIVM report 388802021.
23. Fenner P J, Lewis R J, Williamson J A, *et al*. (1997). A Queensland family with ciguatera after eating coral trout. *Med J Aust* **166**, 473-475.
24. Lucas R E, Lewis R J, Taylor J M (1997). Pacific ciguatoxin-1 associated with a large common-source outbreak of ciguatera in East Arnhem Land. *Nat Toxins* **5**, 136-140.
25. Gordon C J, Mohler F S, Watkinson W P, *et al*. (1988). Temperature regulation in laboratory mammals following acute toxic insult. *Toxicology* **53**, 161-178.
26. Gordon C J (2005). *Temperature and Toxicology: An Integrative, Comparative, and Environmental Approach*. CRC Press, Boca Raton, Florida.
27. Lewis R J, Jones A (1997). Characterization of ciguatoxins and ciguatoxin congeners present in ciguateric fish by gradient reverse-phase high-performance liquid chromatography/mass spectrometry. *Toxicon* **35**, 159-168.
28. Lewis R J, Jones A, Vernoux J P (1999). HPLC/tandem electrospray mass spectrometry for the determination of sub-ppb levels of Pacific and Caribbean ciguatoxins in crude extracts of fish. *Anal Chem* **71**, 247-250.

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