

# Two patients with ciguatera toxicity: a seafood poisoning in travellers to (sub) tropical areas

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## ABSTRACT

Ciguatera toxicity is a type of seafood poisoning caused by the consumption of ciguatoxic reef fish. We describe two patients with characteristic gastrointestinal and neurological symptoms, both of whom had eaten local seafood. Although mortality is low, morbidity can be considerable due to debilitating symptoms. Most cases originate in the (sub) tropics but due to expanding tourism and fish exportation, it may be encountered in more temperate regions. Treatment is supportive, but some benefit from intravenous mannitol has been reported.

## KEYWORDS

Ciguatera, ciguatoxin, fish poisoning, marine seafood, tropical disease

## INTRODUCTION

Due to the expanding tourism to (sub)tropical countries, physicians are increasingly likely to encounter patients suffering from marine intoxications. The world's oceans harbour hundreds of different types of toxins with widely varying clinical manifestations of the accompanying diseases. We report two patients most likely suffering from ciguatera poisoning, a seafood-borne toxin-mediated illness.

## CASE REPORTS

### Case 1

A 27-year-old female teacher visited our outpatient clinic. During her recent honeymoon trip to Mexico, she had developed severe headache accompanied with pain in the back and joints, abdominal discomfort and attacks of sweating, nausea and itching. Most remarkable, however,

were the sensibility disturbances with prickling sensations all over her body and the reversal of temperature sensation. A physical examination did not reveal any abnormalities. Laboratory results were normal. On specific questioning, she remembered having eaten local seafood the evening before developing these symptoms. The tentative diagnosis of ciguatera toxicity was then made and she was reassured about the self-limiting character of the symptoms. She completely recovered in the next couple of weeks.

### Case 2

A 31-year-old woman on holiday in Queensland, Australia, suffered from diarrhoea, myalgia and reversal of temperature sensation in arms and legs, all of these symptoms developing a couple of hours after having consumed a barracuda fish. After being admitted to a local hospital she was diagnosed with probable ciguatera toxicity and treated with intravenous mannitol. She still suffered from attacks of itching, severe fatigue and reverse temperature sensation for the rest of her holiday, which only settled down nine weeks later.

## DISCUSSION

Ciguatera toxicity is a type of seafood poisoning caused by the consumption of ciguatoxic reef fish. The disease is named after a turban-shelled snail known as 'cigua' in the Spanish Antilles, which was erroneously thought to be the cause by Spanish explorers to Cuba in the 1500s.<sup>1</sup> Worldwide incidence is estimated to be between 10,000 and 50,000 patients yearly, which is likely to be an underestimation. A recent review summarises the epidemiological aspects and temporal trends from 1992 until 2001 in French Polynesia.<sup>2</sup> Although mortality is low, morbidity can be considerable and debilitating symptoms may persist for some time.

Most cases originate in the (sub)tropics between 35° latitude north and south of the equator (*figure 1*) in the Caribbean and the Pacific Ocean. However, due to expanding tourism and fish exportation, manifestations of ciguatera toxicity may be encountered in more temperate regions. For example, French researchers in Marseille diagnosed ciguatera poisoning 18 times between 1997 and 2002, one of them with a lethal outcome.<sup>3</sup>

The source of the toxins responsible for ciguatera poisoning is marine dinoflagellates of the genus *Gambierdiscus toxicus*, single celled algae-like organisms growing on and around coral reefs.<sup>4,5</sup> When ingested by reef-dwelling tropical fish such as the barracuda, moray eel, parrot fish and red snapper (*figure 2*), the toxins accumulate in fish organs and flesh. Toxins are concentrated in large predatory fish and ultimately cause ciguatera poisoning if subsequently consumed by humans, being the last part of the food chain. It is not clear why the more than 400 known vector fish do not suffer from the toxin-related symptoms themselves. It is hypothesised that there might be a protecting mechanism working by means of sequestration proteins.

Ciguatoxins are lipid soluble, heat stable, acid-resistant neurotoxins of which nearly 20 have already been isolated. They have different modes of action.<sup>5,6</sup> Some of them have been identified as sodium channel agonists. By opening these voltage-gated channels, membrane depolarisation of excitatory neurons is triggered and characteristic gastrointestinal, neurological and, to a lesser extent, cardiovascular symptoms occur (*table 1*).<sup>5</sup> In both of our patients the initial symptoms were quite classic with predominantly gastrointestinal and neurological manifestations. Gastrointestinal manifestations occur a couple of hours (median 7.5) after ingestion of a contaminated fish and resolve quickly. Neurological symptoms tend to develop later, up to until 72 hours after

fish consumption and last longer, sometimes even for months or years, but most patients recover spontaneously.

During the recovery period, ciguatera toxicity victims should be told to avoid ingesting fish products, alcoholic beverages and nuts and to be cautious with coffee, tea and chocolate, because all of these may result in an exacerbation of the symptoms.

Ciguatera poisoning is rarely lethal with mortality rates of 0.1%, although mortality rates up to 12% have been reported. Death is usually attributed to cardiovascular collapse or respiratory failure.

The diagnosis is based upon history and clinical findings. Our first case was even diagnosed a couple of weeks after fish ingestion due to the classic presentation. Until now there is no commercially available serum test for the toxin. Fish can be screened with a mouse bio-assay, an IgG immuno-assay and, recently, a pharmacological assay, but these tests are quite expensive.<sup>7</sup> Hope for a validated diagnostic test is, however, rising with the recent development of a blood collection card based on a cytotoxicity assay, which was tested favourably in mice.<sup>8</sup>

Treatment of ciguatera -if recognised- is supportive and often disappointing. There are some reports with both *in vivo* and *in vitro* data, describing a beneficial effect of intravenous mannitol (1 gram/kg bodyweight),<sup>9</sup> but the mechanism of action is unclear. Mannitol may act as a toxin scavenger or receptor antagonist, but it also induces osmotic diuresis, which may contribute to the favourable effect. However, this beneficial effect could not be confirmed in a randomised trial.<sup>10</sup>

Quite a lot attention is being focussed on the possible benefits of some local plant extracts, which are able to prevent the occurrence of spontaneous membrane depolarisation of nerve fibres,<sup>11</sup> but further research is needed.

**Figure 1.** Geographic distribution of ciguatera poisoning

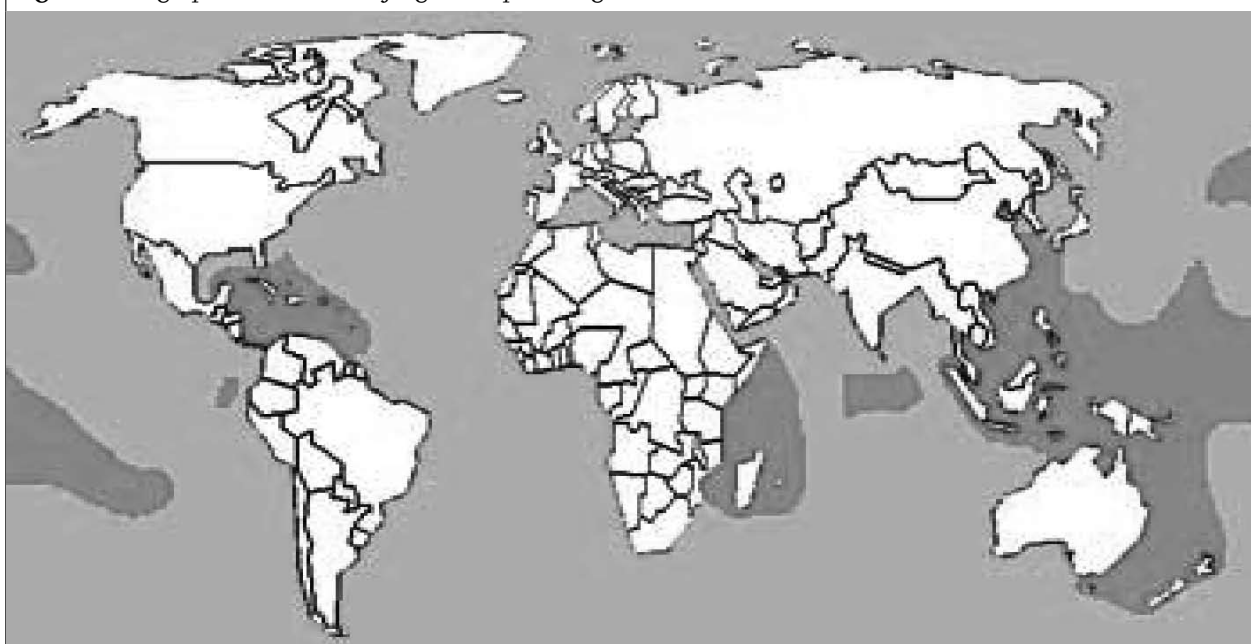


Figure 2. Vector fishes of ciguatera toxins

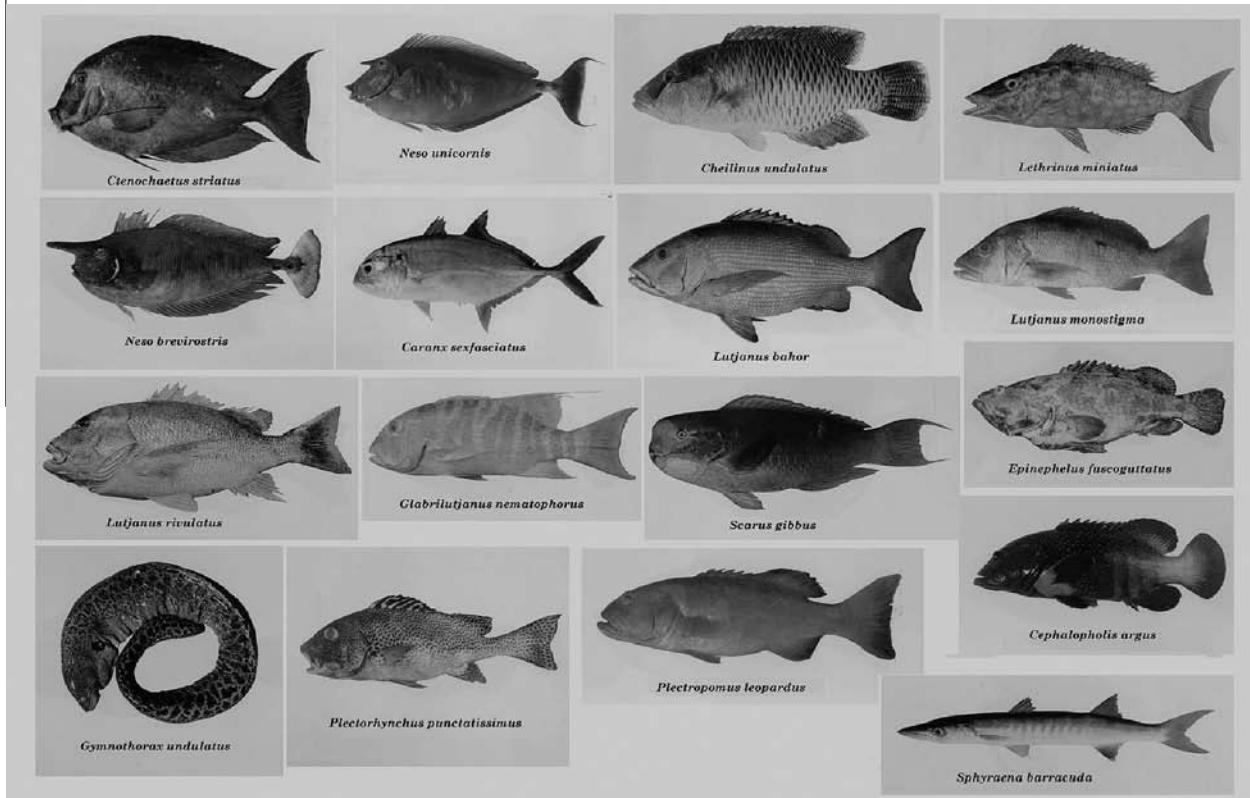


Table I. Signs and symptoms commonly associated with ciguatera toxicity

Gastrointestinal	Neurological	Cardiovascular	Other
Abdominal pain	Lingual and perioral paraesthesias	Bradycardia	Arthralgias
Nausea and vomiting	Paraesthesias of the extremities	Conduction abnormalities	Myalgias
Diarrhoea	Paradoxal temperature sensation	Hypotension	Pruritus
	Respiratory paralysis		
	Ataxia		
	Coma		

## CONCLUSION

Since the disease is toxin-mediated, affected individuals do not develop protecting immunity. Thus, prevention by avoidance of the ingestion of high-risk fish remains the option of choice. Because accumulation of toxins in the food chain is a prerequisite, it seems wise to follow a local piece of wisdom 'avoid eating fishes larger than a dinner-plate'.

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