Ciguatera Poisoning: Information Sheet

What is Ciguatera? Where does it come from?
Ciguatera is a toxin that is produced in a certain species of a single celled marine organism called a dinoflagellate. This species is called *Gambierdiscus toxicus*, and it is found in tropical areas worldwide. *G. toxicus* settles on macro algae and dead coral heads. In Hawaii, *G. toxicus* is commonly found on the red alga *Spyridia filamentosa*, and has also been found on the algae *Turbinaria sp.*, *Jania sp.*, and *Laurencia sp.*

For the scientist: Ciguatera toxin is actually made up of three toxic agents: ciguatoxin, scaritoxin, and maitotoxin. These molecules are produced as secondary metabolites by a density-dependent mechanism - there must be a certain concentration of *G. toxicus* present to trigger genetic manufacturing of the toxic metabolites. Other causes that trigger production are not fully understood, although a type of cell communication called Quoron Sensing may play a role.

When did Ciguatera originate?
Ciguatera is a natural occurrence. The first reports of poisoning date to about 600 BC. Captain James Cook reported poisoning with the same effects in his crew in the 1700s. Humans have not caused this poison to originate through pollution or other anthropogenic impacts; however, pollution and coral reef damage will likely promote the growth of *G. toxicus* populations. Unhealthy coral reefs have much more macro algae and dead coral heads, the prime habitat for *G. toxicus*.

Ciguatera poisoning is caused by eating certain fish. Why?
Herbivorous fish graze on macro algae that harbor *G. toxicus*, and the toxin is stored in their fatty tissues. When predatory fish such as barracuda and grouper eat affected herbivores, they then store all the toxicity that each prey fish has already accumulated in greater concentration. Cooking, freezing, drying, and freshness have no effect on the presence of the toxin. Consumption of the toxin can cause problems in the gastrointestinal, neurological, and cardiovascular systems. Poisoning can be fatal in severe cases.

What are the specific side effects?
There are many different side effects, and not all are reported by all patients. Gastrointestinal symptoms include diarrhea, abdominal cramps and vomiting. Neurological symptoms may include paresthesias, pain in the teeth, pain on urination, blurred vision, and temperature reversal (perceiving hot as cold and cold as hot). Cardiovascular symptoms include arrhythmias and heart blockage.

Depending on the severity of poisoning, these symptoms may last from two days to (rarely) two years, and there are also a few reported chronic cases. However, most cases are short-lived. During the 3-6 months after poisoning, foods such as fish, nuts, ethanol, and caffeine should be avoided, since they may trigger a relapse.

How often does poisoning occur?
As reported by the FDA, the incidence of poisoning is not yet known. The disease has only recently been receiving attention in the medical community, and it is likely that many cases go undiagnosed and unreported. Since the disease is often short-lived and non-fatal, accurate reporting is harder to come by.

How can I avoid being poisoned?
To avoid poisoning completely, one would have to avoid eating any tropical reef fish, as the toxin has been found in over 400 species. For many people here in Hawaii, this is not a viable option, so it is important to know which fish to avoid. Toxins accumulate in large predatory fish, especially grouper, barracuda, jack, snapper, triggerfish, and mackerel. Also, the toxin accumulates most heavily in the head, organs, and roe, so those parts of a fish should be avoided. There are commercial test kits available to check for Ciguatera presence in fish, available through Oceanit Test Systems – 808-531-3017, http://cigua.oceanit.com. Ciguatera test kits should also be available at local fishing stores.

Where has recent poisoning occurred in Hawai’i?
In Hawai’i, poisoning has been reported on the Big Island, Oahu, Maui, Kaua’i, and even from the Northwestern Hawaiian Islands. On Kaua’i, the implicated fish also included surgeonfish. The toxic fish were found in 2002, between Princeville and Milolii on the north shore, and near Koloa on the south. However, toxicity of fish is sporadic. Poisoning on the North shore of Kaua’i occurs most often between May and August.

Why are some people poisoned and some not, even if they eat the same fish?
Ciguatera accumulates in the food chain because bodies store the fat-soluble toxin. People may be exposed to the toxin at a low level and have no symptoms, but they will continue to harbor the toxin in their bodies for a period of time. If they eat another fish with a small amount of Ciguatera, the amount of Ciguatera in their bodies may reach the threshold for poisoning. People also have inherently different tolerances for the toxin.

If you suspect Ciguatera poisoning, call the Department of Health or a Poison Control Center immediately!

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