Ciguatera Fish Poisoning in the Northwestern Gulf of Mexico

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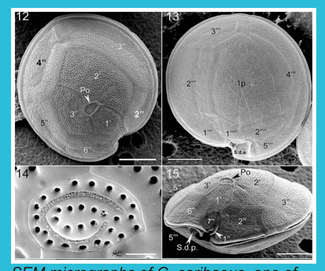
Ciguatera fish poisoning (CFP) in humans is caused by the consumption of fish that have accumulated ciguatoxins. Ciguatoxins are accumulated in carnivorous fishes through the consumption of reef fishes that feed on algae harboring *Gambierdiscus* spp. dinoflagellates. A ciguatoxic fish does not look, taste, or smell differently from a nontoxic fish; and the toxin cannot be destroyed by cooking or freezing.



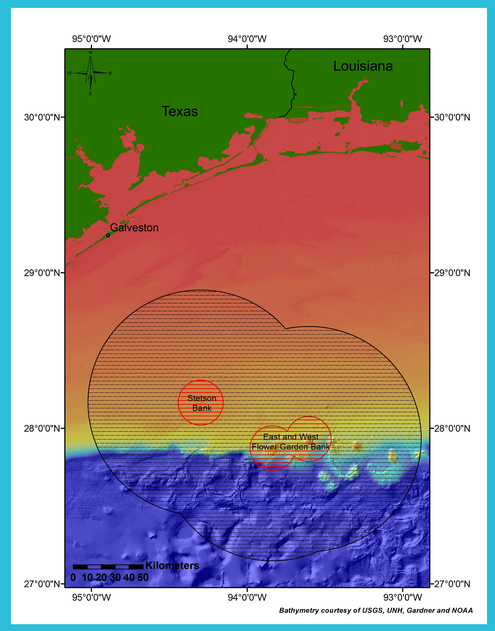
SEM micrographs of G. caribaeus, one of the six species documented in FGBNMS. (Image: Litaker et al., 2009)

Macroalgae (Dictyota sp. pictured) harbors Gambierdiscus spp. dinoflagellates. (Image: FGBNMS/R. Eckert)

Large grouper species, such as this Tiger Grouper (Mycteroperca tigris), exhibit site fidelity; this along with their recreational importance raises much concern about their consumption when caught in ciguatoxic areas. (Image: FGBNMS/G.P. Schmahl)

Gambierdiscus spp. have been found on naturally occuring banks and petroleum production platforms throughout the Northwestern Gulf of Mexico (NWGOM) (Tester et al. 2009; Villareal et al. 2007). Six species of *Gambierdiscus* have been documented in Flower Garden Banks National Marine Sanctuary. *Gambierdiscus* spp. have been documented in the sanctuary at depths greater than 45m , the deepest record to date (Tester et al. 2009).

Fish sampled to test for ciguatoxins after a reported CFP case in 2007. (Image: FGBNMS)



FDA designated 10 mile (red) and 50 mile (black) advisory zones around the Flower Garden Banks National Marine Sanctuary. (Image: FGBNMS/M. Nuttall)

In 2007, the Food and Drug Administration (FDA) confirmed multiple cases of CFP from a Gag Grouper caught in FGBNMS. Around this time, FDA also confirmed cases of CFP from fish that originated in the NWGOM; the cases included reports from Galveston, TX; New Orleans, LA; Washington, DC; St. Louis, MO; and Chicago, IL. As a response, researchers from FGBNMS and University of Texas Marine Science Institute sampled 12 species of fish around FGBNMS for ciguatoxins. 13% of the sampled fish, including Marbled Grouper, Great Barracuda, Scamp, and Sand Tilefish, were found to have high levels of ciguatoxins (Villareal, 2007). This led FDA to issue a letter of guidance to seafood processors recommending they avoid purchasing large carnivorous reef fish caught near FGBNMS.

In 2011, FDA confirmed another case of CFP from grouper caught within the sanctuary. FGBNMS and FDA began a collaborative study to re-examine ciguatera in the NWGOM. Researchers are currently sampling macroalgae and fish in this region. Macroalgae samples are collected and analyzed for *Gambierdicus* spp. density. Fish are collected, weighed and measured; tissue samples are analyzed for ciguatoxins and sub-samples are sent out for mercury analysis. Otoliths are removed and used for aging fish.

Researcher removes an otolith from a Red Snapper (Lutjanus campechanus) to age the fish. (Image: FGBNMS/R. Eckert)

Resources:

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Tester, P.A., Vandersea, M.W., Buckel, C.A., Kibler, S.R., Holland, W.C., Davenport, E.D., Clark, R.D., Edwards, K.F., Taylor, J.C., Vander Pluym, J.L., Hickerson, E.L., Litaker,R.L., 2013. Gambierdiscus (Dinophyceae) species diversity in the Flower Garden Banks National Marine Sanctuary, Northern Gulf of Mexico, USA. Harmful Algae 29 (1),1-9.

Villareal, T.A, Hanson,S., Qualia, S., Jester, E.L.E., Granade, H.R., Dickey, R.W., 2007. Petroleum production platforms as sites for the expansion of ciguatera in the northwestern Gulf of Mexico, Harmful Algae 6 (2), 253-259.

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