Ciguatera Fish Poisoning

PROTOCOL CHECKLIST

- ☐ Enter available information into Merlin upon receipt of initial report
- ☐ Review information on ciguatera fish poisoning (CFP) and its epidemiology (see page 3), case definition (see page 4), and exposure information (see page 3)
- ☐ Contact provider
- ☐ Interview patient(s)
  - ☐ Review the facts on CFP (see page 3)
    - ☐ Sources of poisoning
    - ☐ Symptoms
    - ☐ Clinical information
  - ☐ Ask about exposure to relevant risk factors
    - ☐ Type or species of fish consumed
    - ☐ Size and weight of fish
    - ☐ Amount of fish consumed
    - ☐ Where the fish was caught or purchased
    - ☐ Where the fish was consumed
    - ☐ Restaurant meals
    - ☐ Other
  - ☐ Identify symptomatic contacts or others who ate the fish
  - ☐ Recommend restrictions from breastfeeding and/or sexual contact
  - ☐ Provide education on how to prevent re-activation of symptoms (see page 3)
  - ☐ If fish remnants are available, coordinate with Regional Environmental Epidemiologist (REE) to determine if testing by the Food and Drug Administration (FDA) is warranted

Ciguatera Fish Poisoning

1. DISEASE REPORTING

A. Purpose of reporting and surveillance

1. To prevent additional cases by identifying any ongoing public health threats that can be mitigated by removing a commercial fish product or issuing public notices about risks from consuming large predatory reef fish in areas with high ciguatoxin endemicity
2. To identify all exposed persons with a common or shared exposure to a ciguatoxic fish; collect fish samples for testing; promote education on the risk factors for illness; describe long-term sequelae; and to provide interventions that facilitate proper treatment and patient identification
3. To gather epidemiologic and environmental data on CFP to target future public health interventions

B. Legal reporting requirements

Chapter 64D-3, *Florida Administrative Code.* Health care practitioners are required to report CFP to the local county health department (CHD) within one working day of identification/diagnosis.

C. County health department investigation responsibilities

1. CFP is a reportable condition in Florida and requires next business day reporting to the county health department (Chapter 64D-3, *Florida Administrative Code*).
2. Immediately begin an investigation to identify all potential sources of exposure.
3. All cases of CFP should be reported to the Regional Environmental Epidemiologist (REE). All patients should be contacted for a public health interview and reported in Merlin.
4. Notify your REE of all potential sources of exposures and the locations where the fish was either self-caught, purchased or consumed. Your REE can coordinate additional follow-up measures such as reporting the specific product information, if the implicated fish was sold commercially, to the regulatory agencies that license the retail food establishments and food products, which include the Food and Drug Administration (FDA) and the Florida Department of Agriculture and Consumer Services (FDACS).
5. Inform your REE of any leftover fish. The REE can assist with arranging collection and shipping of samples to the FDA Gulf Coast Seafood Laboratory in Dauphin Island, Alabama for laboratory testing and will notify the appropriate FDA office in Florida to report ciguatera cases.
6. Report all cases of CFP (see case definition below) to the Bureau of Epidemiology using the case report form found under ciguatera: http://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/index.html

2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic agent

CFP is an acute illness resulting from the consumption of marine toxins called ciguatoxins. Ciguatoxins are produced by the dinoflagellate alga *Gambierdiscus toxicus.* These toxins can become biomagnified through the food web. Transfer of ciguatoxins can occur when fish consume toxic algae growing on coral reefs. These contaminated fish are later consumed by larger predatory reef fish that can accumulate higher amounts of ciguatoxins in their muscle tissue, organs, and fat. When large predatory reef fish from affected areas are consumed, there is a potential risk of ingesting ciguatoxins.

B. Description of illness

CFP patients may present with gastrointestinal, neurological, and cardiac symptoms with a typical onset within 24 hours following fish consumption. Gastrointestinal symptoms typically present first, followed by neurological symptoms, which usually begin 1-2 days following the exposure. However, presentation is variable depending on the individual and geographical source of ciguatoxin. Symptoms reported may include: abdominal cramps, nausea, vomiting, diarrhea, paresthesia (numbness or tingling) of lips, tongue, and extremities, a metallic taste, arthralgia (joint pain), myalgia (muscle pain), and blurred vision. One common symptom that makes CFP somewhat unique in clinical presentation is “temperature reversal”, which causes the patient to report that hot foods/beverages feel cold and, conversely, cold items feel hot. Items such as alcohol, caffeine, chocolate, nuts or nut oils, antihistamines, fish or fish sauces, and shellfish have been reported to re-activate symptoms in some persons. Patients should also be advised to avoid cold showers, strenuous exercise, unprotected sex, and breastfeeding until symptoms subside. Please refer to the case report form for an extensive list of all symptoms that are associated with CFP: http://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/index.html

C. Reservoirs

Over 400 known fish species have been classified as potential ciguatoxin carriers. Examples of species associated with Florida cases from 2003-2013 include barracuda, grouper, amberjack, mahi mahi, snapper, amberine, Coronado, eel, hogfish, king mackerel, sea bass and tilefish. Recently, FDA added exotic lionfish to the list.

D. Modes of transmission

CFP is typically acquired from eating fish that contain ciguatoxins. Rare secondary cases of mother-to-child transmission during breastfeeding and sexual transmission have been reported.

E. Incubation period

Gastrointestinal symptoms begin within minutes to 24 hours after eating ciguatoxic fish; with an average incubation period ranging from 6-24 hours. Neurological symptoms can begin up to 48 hours after exposure.

F. Period of communicability

The periods of communicability for mother-to-child breastfeeding transmission and sexual transmission are unknown.

G. Treatment

The toll-free Florida Poison Information Center Hotline (1-800-222-1222) is available to provide consultation and answer questions on CFP and other marine toxin related illnesses. Patients should contact their doctor or local emergency room immediately following onset of symptoms to report their condition and the type of reef fish consumed. Some patients with CFP have been treated with IV Mannitol within 48-72 hours of exposure with some level of success.

H. Prophylaxis

None indicated

I. Ciguatera Fish Poisoning (CFP) in Florida

In a ten-year analysis of Florida CFP cases from 2003–2013, 331 cases were reported, with an average of 33.1 cases per year. The global incidence of CFP is approximately 50,000 cases per year.[4]

3. CASE DEFINITIONS

A. Clinical description

Symptoms include abdominal cramps, nausea, vomiting, diarrhea, numbness and paresthesia of lips and tongue, paresthesias of the extremities, metallic taste, arthralgia, myalgia, blurred vision. Paradoxical temperature sensation is sometimes seen. The illness is associated with the consumption of reef or bottom-dwelling fish such as barracuda, amberjack, grouper, or snapper.

B. Laboratory criteria for diagnosis

Detection of ciguatoxin in implicated fish is strongly suggestive, but is not necessary for case confirmation.

C. Case classification

Confirmed**:** A clinically compatible illness in a patient with a history of fish consumption in the 24 hours before onset of symptoms

D. Comment

Even single sporadic cases should be reported as a single-case outbreak to the regional environmental epidemiologist. Testing for the toxin in implicated fish is available from the FDA. Contact your regional environmental epidemiologist for information.

4. LABORATORY TESTING

A. Criteria for diagnosis

Laboratory testing to detect ciguatoxins in humans is not currently available. The case definition requires that persons who meet the confirmed case definition have an exposure history, which includes fish consumption with an onset of symptoms within 24 hours of exposure.

B. Laboratory services available

The Florida DOH Bureau of Public Health Laboratories does not provide ciguatoxin testing. Fish testing is available at the FDA Gulf Coast Seafood Laboratory in Dauphin Island, Alabama and is strongly encouraged in the event remnant fish samples are available. Contact your REE who can advise on food sample collection and shipping to FDA.

Commercially available ciguatera testing kits have been found to be unreliable in evaluating fish for the presence of ciguatoxins. Florida DOH, the Centers for Disease Control and Prevention (CDC), and FDA do not recommend the use of these kits for testing.

C. Testing requirements

Sample Collection: Any remaining portion of the fish should be kept frozen at -20°C. This includes meal remnants (even if in the form of soup, salad, etc), as well as any uncooked portion of the fish that was actually consumed. Sample(s) should be double-bagged and securely sealed. As a last resort, the Gulf Coast Seafood Laboratory may provide an insulated shipping box and gel packs (“blue ice”). Dry ice is desirable but not required, as long as fish samples and gel packs are hard-frozen before shipment. Contact your REE to facilitate shipping to the FDA Gulf Coast Seafood Laboratory.

5. CASE INVESTIGATION

A. Evaluate the diagnosis

1. Determine whether CFP has been diagnosed and review the clinical symptoms collected through medical records or public health interviews.

2. Obtain the following:
   a. Date of symptom onset
   b. Signs and symptoms
   c. Predisposing conditions (e.g., immunosuppression)
   d. Treatment

3. Ask what information has been given to the patient, including whether the patient knows about the diagnosis.

4. Obtain as much demographic information as possible, including contact information (home, cellular, and/or work numbers). Ask how and where the patient can be contacted (i.e., at hospital or home).

5. Notify the physician that you will be contacting the patient as Florida DOH follows up on all cases of ciguatera fish poisoning to assess exposure, to better characterize the occurrence of CFP in Florida, and to identify potential means for preventing further

illness. It may also be appropriate, at this point, to determine if the physician has any concerns about the health department contacting the patient.

B. Identify potential sources of infection

1. Contact the patient and any persons who had an exposure to the same fish to determine if they are ill and to complete a three-day food history as soon as possible after being reported to optimize recall.
   a. Make at least three phone call attempts to reach the patient.
   b. Calls should be made at different times of the day, with at least one attempt in the evening.
   c. Ask the patient about all fish consumed prior to onset of illness.
   d. Collect details about the type of fish species consumed, site of harvest/purchase, and date of harvest/purchase.

C. Identify potentially exposed persons

1. **Immediately** identify persons who shared the same exposure as the patient and provide educational information about symptoms of CFP and where to obtain treatment if symptoms develop later.
2. Complete the Ciguatera Case Report Form for each ill person and report each ill contact in the same manner as the initial case: http://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/index.html.

D. Environmental evaluation

Obtain any product information available about where the fish was purchased (address, time, date, brand name, etc.) for commercially purchased fish or the location (body of water, nearest town, latitude/longitude coordinates, etc.) if the fish was self-caught. The FDA or FDACS may use this information for product trace-back purposes.

E. Merlin data entry

Create a profile in Merlin under disease code CIGUATERA FISH POISONING-98809. Enter the data collected in Merlin, being sure to include all required fields on the Basic Data screen, complete the Case Symptoms screen and attach the completed case report form.

6. CONTROLLING FURTHER SPREAD:

A. Patient/ household education on prevention recommendations

Since CFP may be transmitted through breastfeeding and unprotected sexual intercourse, it is advised that these activities be discontinued while patient is symptomatic.

B. Isolation of cases

None indicated except to refrain from breastfeeding and sexual intercourse.

C. Management of contacts

N/A

D. Human laboratory testing during outbreaks

Not indicated

E. Food is implicated as the source of an outbreak

If the fish which caused the ciguatera fish poisoning is still available, do not eat it. If possible send it for testing and if not, it should be disposed of.

1. Preventing ciguatoxin from entering the food supply is a challenge because fish screening testing methods are not available. Proper cooking and food storage methods do not remove ciguatoxins from seafood; the toxins do not emit a taste or odor. Ciguatoxin is a heat-stable toxin and adequately cooked fish can still be toxic.
2. Avoid consumption of large predatory reef fish from affected areas. Barracuda are especially at high risk for ciguatoxin accumulation.
3. The toll-free Florida Poison Information Center or Poison Control Hotline at 1-800-222-1222 is available to provide consultation on CFP and other marine toxin illnesses. You may also visit the FL-DOH website for associated information on marine harmful algal blooms: http://www.floridahealth.gov/healthy-environments/aquatic-toxins/index.html.

7. MANAGING SENSITIVE SITUATIONS

Any case of CFP should be investigated as an outbreak, please **notify your Regional Environmental Epidemiologist.** Provide information collected about specific products to your REE who will notify regulatory agencies that oversee commercial fish sales.

8. IMPORTANT LINKS

A. Ciguatera Case Report Form: http://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/index.html

B. Florida Department of Health (DOH):
http://www.floridahealth.gov/environmental-health/aquatic-toxins/index.html

C. Food and Drug Administration (FDA):
http://www.fda.gov/downloads/Food/FoodSafety/FoodborneIllness/FoodborneIllnessFoodbornePathogensNaturalToxins/BadBugBook/UCM297627.pdf

D. Inter-agency Technical Guide (available at the DOH Aquatic Toxins web page):
http://www.floridahealth.gov/environmental-health/aquatic-toxins/educational-and-outreach-materials-aquatic-toxins-program.html

E. Food and Waterborne Disease Program–Contact List
http://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/_documents/environmentalepimap3-21-14color.pdf

F. Tri-Agency Foodborne Illness Survey/Complaint Form
http://www.floridahealth.gov/diseases-and-conditions/food-and-waterborne-disease/online-food-complaint-form.html

9. REFERENCES

A. **Centers for Disease Control and Prevention (CDC):**
http://www.cdc.gov/nceh/ciguatera/

B. **US Food and Drug Association (FDA):**
Guidance for Industry: Purchasing Reef Fish Species Associated with the Hazard of Ciguatera Fish Poisoning
http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/ucm375214.htm

C. **Bad Bug Book: Foodborne Pathogenic Microorganisms and Natural Toxins Handbook Ciguatera**
http://www.fda.gov/downloads/Food/FoodbornelllnessContaminants/UCM297627.pdf