Scombroid Fish Poisoning (SFP)

A. Protocol checklist

General activities

- ☐ Enter available information into Merlin upon receipt of initial report
- ☐ Review information on scombroid fish poisoning (SFP) and its epidemiology (**section B**), case definition (**section C**), and exposure information (**section B**)
- ☐ Contact provider or hospital
- ☐ Interview patient(s) (**section E**)
  - ☐ Review facts on SFP (**section B**)
    - ☐ Sources of poisoning
    - ☐ Symptoms
    - ☐ Clinical information
  - ☐ Ask about exposure to relevant risk factors
    - ☐ Type or species of fish consumed
    - ☐ Where the fish was consumed, purchased, or acquired
    - ☐ Amount of fish consumed
    - ☐ Preparation method
    - ☐ Restaurant meals
  - ☐ Determine if any leftover product is available for testing (**section D**)
  - ☐ Identify symptomatic contacts or others who consumed the fish
- ☐ If commercial facility is involved (restaurant/market), enter into Florida Complaint and Reporting System (FL-CORS)
  - ☐ Contact your **Regional Environmental Epidemiologist** (REE)
- ☐ Enter any additional information gathered into Merlin (**section F**)
- ☐ If fish remnants are available, coordinate with REE to determine if testing by Florida Department of Agriculture and Consumer Services (FDACS) is warranted (**section D**)
- ☐ Coordinate environmental assessment if applicable (**section E**)

B. Disease reporting and epidemiology

Purpose of reporting and surveillance

1. To prevent additional cases by identifying any ongoing public health threats that can be mitigated by identifying any fish available commercially and removing it from the marketplace or issuing public notices about the risks from consuming scombrotoxic fish that have undergone temperature abuse.
2. To identify all exposed persons with a common or shared exposure to a scombrotoxic fish, collect fish samples for testing, promote education on the risk factors for illness, and provide interventions that facilitate proper fish handling to prevent temperature abuse.
3. To gather epidemiologic and environmental data on SFP to target future public health interventions.

Legal reporting requirements

Per Chapter 64D-3, *Florida Administrative Code*, health care practitioners are not specifically required to report SFP; however, SFP falls under the category of "any case, cluster of cases, outbreak, or exposure to an infectious or non-infectious disease, condition, or agent found in the general community or any defined setting such as a hospital, school or other institution, not listed in this rule that is of urgent public health significance" and thus requires reporting within one business day.

CHD investigation and intervention responsibilities

1. SFP is reportable per the statement in Chapter 64D-3, *Florida Administrative Code* noted above and requires next business day reporting to the county health department (CHD).
2. Immediately begin an investigation to identify all potential sources of exposure.
3. Notify your **REE** of all potential sources of exposures and the locations where the fish was consumed, purchased, or acquired. Your REE can coordinate additional follow-up measures as needed.
4. Inform your REE of any leftover fish. The REE can assist with arranging collection and shipping of samples to FDACS for histamine analysis.
5. Report all cases (see **Case Definition** below) to the Bureau of Epidemiology using the extended data screen in Merlin.

Etiologic agent

Scombroid poisoning, also called "scombrotoxin" or "histamine fish poisoning," describes an allergic type reaction to high levels of histamine in improperly stored fish. The term "scombroid" comes from the name of the *Scombridae* family of fish, members of which (tuna, mackerel, bonito) were first implicated in this type of toxin production. However, the list of fish implicated in scombroid poisoning has since been expanded to include various other fish, rendering the naming convention confusing. In essence, these are the tunas (*Scombridae* family) plus "oily" fish or "dark meat" fish (mahi-mahi, sardines, others). In addition, in Florida tilapia, salmon, and swai have been implicated in outbreaks. Fish known to be associated with this type of toxin production:

Common Name	Common Name
Amberjack*	**Milkfish**
Anchovy	**Sailfish**
Bluefish	**Sardine**
Bonito	**Saury**
Escolar	**Scad**
Herring	**Shad**
Hind	**Spearfish**
Jack	**Sprat**
Kahawai	**Swordfish**

Mackerel*	**Trevally**
Mahi-mahi*	**Tuna***
Marlin	**Wahoo**
Menhaden	**Yellowtail**
Adapted from Fish and Fishery Products; Hazards and Controls Guidance; Fourth Ed, March 2020, FDA; Chapter 3, Table 3–2[1] *Implicated in Florida in last ten years; also tilapia, swai, salmon	

Table 1: Scombrotoxic Fish Types

These fish all have certain bacteria which, after the fish dies and if the temperature is above 40°F, convert available histidine in the fish into histamine toxins. Consumption of the fish then produces a reaction that resembles an allergic reaction. Once the temperature abuse has occurred, cooking, smoking, canning, or freezing do not destroy the toxin. Histamine production can occur anytime in the supply chain from harvest through transportation and distribution to the restaurant or market. The goal of any scombroid investigation is identifying where the contamination occurred in the supply chain.

Illness

SFP can vary in severity from a mild histamine reaction (typically facial or trunk flushing) to a more severe reaction (itching or burning around mouth or throat, headache, dizziness, heart palpitations, drop in blood pressure, shortness of breath or respiratory distress) to severe gastrointestinal symptoms (nausea, vomiting, diarrhea).[2–4] Cases sometimes report their food tasting “peppery” or “metallic.”

Reservoirs

Certain types of fish (as described above) that produce histamine during decomposition.

Modes of transmission

Transmission is by ingestion of histamine-containing food, typically fish.

Incubation period

Symptoms usually begin within 20–30 minutes (and up to a few hours) after eating the product and can last up to 6–8 hours if treated and 24 hours if left untreated.[2–4]

Period of communicability

SFP is not communicable from person to person.

Treatment

SFP management is typically the same as for allergic reactions and relies upon the use of antihistamines. Response is generally rapid, but symptoms will generally resolve within 24 hours even without treatment.[3–4].

Post-exposure prophylaxis

None indicated.

Immunity

Individuals do not acquire any immunity to SFP.

SFP in Florida

SFP was not listed as a separate disease in Merlin until 2018. Thus, reporting was sporadic prior to then and only found in FL-CORS. In 2018 and 2019 there were a total of 68 outbreaks reported involving 82 cases.

C. Case definition

Background
Symptoms of scombroid poisoning include tingling or burning in or around the mouth or throat, rash, hives, itching of the skin, drop in blood pressure, headache, dizziness, nausea, vomiting, diarrhea, asthmatic-like constriction of air passages, heart palpitations, and respiratory distress. Symptoms can occur within a few minutes to a few hours of consumption and last from 12 hours to a few days and occur after consumption of fish known to produce histamine.

Clinical criteria for case classification
One or more of the following symptoms—tingling or burning in or around mouth or throat, rash, hives, itching, drop in blood pressure, headache, dizziness, nausea, vomiting, diarrhea, asthmatic-like constriction of air passages, heart palpitations, respiratory distress.

Laboratory criteria for diagnosis
Not applicable.

Epidemiologic criteria for case classification
A person with a history of consuming fish known to produce histamine in the two hours before onset of symptoms.

Case classification
Confirmed: A clinically compatible illness in a person with epidemiologic criteria.

Criteria to distinguish a new case from a previous report
Not applicable.

Comment
Even single sporadic cases should be reported as a single-case outbreak to the REE. Testing for the toxin in implicated fish is available from the FDACS. Contact your REE for information.

D. Laboratory testing

Criteria for diagnosis

Laboratory testing for scombrotoxin in humans is not currently available. The case definition requires that persons have an exposure history, which includes fish consumption with an onset of symptoms within two hours of exposure. Detection of histamine in implicated fish is strongly suggestive but is not necessary for case confirmation.

Services available at Bureau of Public Health Laboratories (BPHL)

No SFP testing services are available at the BPHL. Histamine analysis of fish is available at the FDACS lab in Tallahassee and is encouraged in the event remnant fish samples are available. Contact your **REE**, who can advise on food sample collection and shipping to FDACS.

Testing requests

1. Contact your **REE** to facilitate shipping to FDACS. The REE will ensure that testing is available and will notify FDACS that a sample is pending.
2. Sample Collection: Any remaining portion of the fish should be kept frozen at -20°C. This includes meal remnants as well as any uncooked portion of the fish that was actually consumed. Sample(s) should be double-bagged and securely sealed. Dry ice is desirable but not required, as long as fish samples and gel packs are hard-frozen before shipment. Samples must arrive at FDACS frozen, or the results will be unreliable.

Interpretation of results

The laboratory will indicate presence of histamine in the sample and quantify the result if present. Histamine presence at >50 ppm indicates decomposition. SFP has been seen at levels of 200 ppm. The Food and Drug Administration has set a regulatory limit of <500 ppm.

E. Case investigation and follow-up

Contact the physician or hospital

1. Request patient medical records from treating provider or the medical facility where the patient was seen.
2. Determine whether SFP has been diagnosed. Review the clinical symptoms collected through medical records or public health interviews.
3. Obtain the following information:
   a. Date of onset of symptoms
   b. Signs and symptoms
   c. Predisposing conditions (i.e., immunosuppression)
   d. Treatment
4. Ask what information has been given to the patient, including whether the patient knows about the diagnosis.
5. Obtain as much demographic information as possible, including contact information (i.e., home, cell, and/or work numbers). Ask how and where the patient can be contacted.

Interview the case

1. Contact the case to complete the interview. Interviews should be completed as soon as possible after being reported to optimize recall.
   a. Make at least three phone call attempts to reach the case.
   b. Calls should be made at different times of the day with at least one attempt in the evening.
2. Items to cover during interview include:
   a. Provide brief background on disease, including mode of transmission, incubation period, symptoms, etc.
   b. Collect details about the type or species of fish consumed, site of harvest, purchase, and/or consumption.
   c. Determine if any fish is available for testing and, if so, request that the fish be frozen.
   d. **I**dentify persons who shared the same exposure as the case and provide educational information about symptoms of SFP and where to obtain treatment if symptoms develop later. Complete the food and

symptom history on each ill person and any non-ill persons who shared the same meal. If other persons meet the case definition, then report in Merlin in the same manner as the index case.

3. Complete the extended data screen in Merlin using information from the interview. Note that the extended data screen serves as the case report form.

Environmental health investigation

Conduct an environmental assessment as soon as practical after the case has been reported. Contact agency of jurisdiction (FDACS or Department of Business and Professional Regulation), if applicable, to conduct joint assessment.

1. Recreationally harvested fish:
   a. Obtain information on location the fish was harvested (body of water, nearest town, GPS location). If commercial charter, acquire name and contact information for charter company.
   b. Determine how fish was handled after harvesting (i.e., temperature, transport, destination).
   c. Outline process for preparation to consumption.
   d. Determine if any fish is leftover.
2. Market-acquired fish:
   a. Review and document the process for the market from receipt to customer purchase.
   b. Take temperatures for each step in the process.
   c. Acquire copies of invoices for implicated product.
   d. Take pictures of any similar product and boxes.
   e. Determine if any fish available from the same lot.
3. Restaurant-acquired or -consumed:
   a. Review and document the process from receipt to consumer.
   b. Take temperatures for each step in the process.
   c. Acquire copies of invoices for implicated product.
   d. Take pictures of any similar product and boxes.
   e. Determine number of similar meals served on same date as case.
   f. Determine if any fish leftover from the meal or from the same lot as the meal was prepared.

F. Merlin data entry and reports

Merlin data entry

Create a case in Merlin under disease code **Scombroid Poisoning reporting code 91000**. Enter all data collected including required fields on the basic data screen and complete the case symptoms screen and the extended data screen. Attach medical records if available. Note the date of the environmental assessment, if applicable, and attach documents and pictures from the assessment. Attach any lab analysis reports.

G. Controlling further spread

Case and household education on prevention recommendations

All individuals consuming implicated fish should be educated on SFP. If the fish which caused the SFP is still available, do not eat it. Either send for testing, as per **REE**, or dispose of it. All persons handling fish should be educated on SFP and the need to maintain a safe temperature throughout the process. See **Resources** below.

Isolation of cases

Not necessary.

Management of contacts

Not applicable.

Immunization recommendations

Not applicable.

Outbreaks

Any case of SFP should be investigated as an outbreak. Please **notify your REE** as soon as possible. Provide information collected about specific products to your REE, who will notify regulatory agencies that oversee commercial fish sales.

H. Managing sensitive situations

Case or symptomatic contact attends or works at a day care facility

No restrictions or exclusions necessary.

Health care settings

No restrictions or exclusions necessary.

I. Resources and references

Resources

CDC Fish Poisoning Website
wwwnc.cdc.gov/travel/page/fish-poisoning-ciguatera-scombroid

Food and Drug Administration Bad Bug Book; Scombrotoxin
www.fda.gov/downloads/Food/FoodborneIllnessContaminants/UCM297627.pdf

SFP Case Report Form
FloridaHealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/index.html

Florida Complaint and Outbreak Reporting Website
www.flcors.com/Home.aspx

Investigation of Foodborne Outbreaks
https://floridahealth.sharepoint.com/sites/DISEASECONTROL/EH/EHmanual/2021%20EH%20Manual%20150-4%20CURRENT%20VERSION/VI.%20Chapter%20G%20Food%20and%20Waterborne%20Disease%20Surveillance%20and%20Investigation%202021%20FINAL.pdf

Regional Environmental Epidemiologist Map
FloridaHealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/environmental-epi-map.pdf

References

1. Food and Drug Administration. Fish and Fishery Products; Hazards and Controls Guidance; Fourth Edition. Chapter 3, Table 3-2. March 2020. Retrieved from www.fda.gov/media/80637/download.

2. United States Food and Drug Administration Center for Food Safety and Applied Nutrition (2012). *Bad Bug Book: Foodborne Pathogenic Microorganisms and Natural Toxins Handbook*. Scombrotoxin, (pp. 207-210). Retrieved from www.fda.gov/downloads/Food/FoodborneIllnessContaminants/UCM297627.pdf.
3. Centers for Disease Control and Prevention (CDC); Fish Poisoning in Travelers: Ciguatera and Scombroid, November 2019, Retrieved from wwwnc.cdc.gov/travel/page/fish-poisoning-ciguatera-scombroid.
4. Hungerford, J, (2010), Scombroid Poisoning: A Review, *Toxicon*, p. 232. www.sciencedirect.com/science/article/abs/pii/S0041010110000450?via%3Dihub.