



# Foodborne Illness Quick Reference

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# General Information

## Classification of FBI's

- Foodborne Infection-
  - After ingestion the organism burrows into the digestive tract and multiplies in number.
  - Can spread to other parts of the body through the blood stream.
  - Bacteria, viruses, and parasites can cause FB infections.
  - Example: Salmonellosis.
- Intoxication-
  - Caused when a living organism multiplies in or on a food and then produces a chemical waste or toxin.
  - After consumption the toxin causes illness (typically called food poisoning).
  - An intoxication may also be caused by man-made chemicals (bleach)
  - Examples: Clostridium botulinum and Staphylococcus aureus.
- Toxin-mediated infection-
  - Caused by consuming a living organism, which then produces a toxin that causes illness.
  - Differs from an intoxication because the toxin is produced inside the body.
  - Example: Clostridium perfringens.

## Bacteria

- All bacteria exist in a vegetative form
  - **Vegetative cells** grow, reproduce, and produce wastes just like other living organisms.
- Some bacteria have the ability to form spores
  - **Spores** help bacteria survive when the environment is too hot, cold, dry, acidic, or when there is not enough food.
  - **Spores** are not able to grow reproduce.

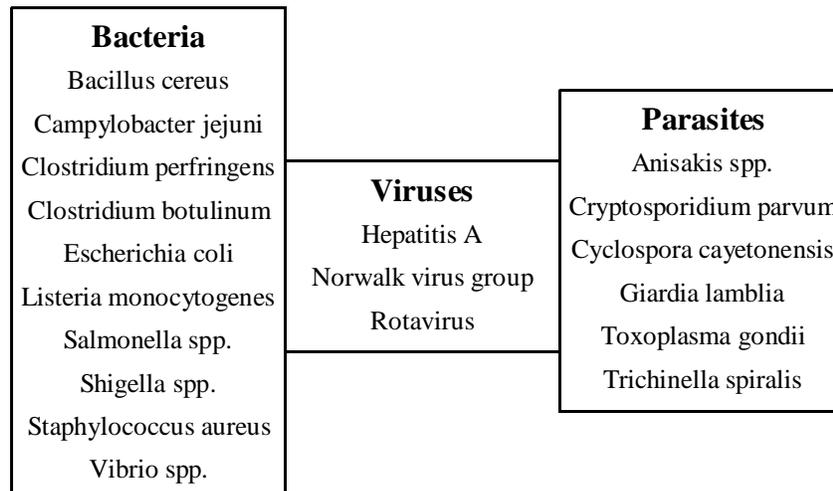
	Vegetative Cells (Optimal Conditions)	Spores (Stress Conditions)
Reproduce	Yes	No
Grow	Yes	No
Produce Toxin	Yes	No
Resistant to Stress	No	Yes
Harmful if Eaten	Yes	No

### Temperature Conditions

- **Psychrophilic** bacteria grow within the range of 32°F to 70°F
  - Most are spoilage organisms, but some cause illness
- **Mesophilic** bacteria grow within the range of 70°F to 110°F
- **Thermophilic** bacteria grow above 110°F
  - All thermophilic bacteria are spoilage organisms

### Oxygen

- **Aerobic** bacteria must have oxygen to grow.
- **Anaerobic** bacteria can not grow when oxygen is present.
  - **Anaerobic** bacteria grow well in vacuum packaged foods.
  - **Anaerobic** bacteria also grow well in the middle of cooked food masses.
- **Facultative anaerobic** bacteria can grow with or without free oxygen.
  - Most foodborne illness causing microorganisms are **facultative anaerobic**.
- **Microaerophilic** organisms have very specific oxygen requirements, usually around 3-6 percent.



# **Anisakiasis**

**Pathogen:** Anisakis spp.

**Type:** Parasitic infection

**Spore Former:** No

**Description:** Anisakis spp. Are nematodes (roundworms) found in fish. They are usually 1 to 1 ½ inches long and the diameter of a human hair. They are beige, ivory, white, gray brown, or pink.

**Incubation Period:** 1 hour to 2 weeks

**Duration of Illness:** less than 3 weeks

**Symptoms:**

-If the worm attaches to the throat: Coughing.

-If the worm attaches to the stomach: vomiting and abdominal pain.

-If the worm attaches to the large intestine: Sharp pain and fever, similar to appendicitis.

**Common Cause:** The worms are transferred to fish (mostly bottom feeders) through seawater.

**Foods Implicated:** Raw, undercooked, or improperly frozen fish, including cod, haddock, fluke, salmon, herring, flounder, monkfish. Sea urchins, crab, shrimp, starfish, and tuna.

**Prevention:** Purchase seafood from approved dealers. Cook seafood to proper temperatures. Properly freeze fish.

# **Bacillus cereus**

**Pathogen:** Bacillus cereus

**Type:** Bacterial intoxication or Toxin-mediated infection

**Oxygen:** Facultative anaerobic

**Spore Former:** Yes

**Incubation Period:** Vomit type: 30 minutes to 6 hours. Diarrhea type: 6 to 16 hours.

**Duration of Illness:** Both less than 24 hours, 12-14.

**Symptoms:** Vomit type: Nausea and vomiting, occasionally abdominal cramps and/or diarrhea. Diarrhea type: Watery diarrhea, abdominal cramps and pain, nausea.

**Common Cause:** Most often associated with foods that are improperly stored (in the “Danger Zone”), which allows spores to convert into vegetative cells. Vegetative cells then produce toxin which leads to illness.

**Foods Implicated:** Vomit type: usually associated with grain products such as rice, potatoes, pasta, corn, cornstarch, soybeans, tofu, and flour. Diarrhea type: meats, milk, vegetables, and fish.

**Prevention:** Foods must be cooked and hot held properly and then cooled down quickly within 4 hours.

# Botulism

**Pathogen:** Clostridium botulinum

**Type:** Bacterial intoxication

**Oxygen:** Anaerobic

**Spore Former:** Yes

**Incubation Period:** 12 to 36 hours, but may vary from 4 hours to 8 days

**Duration of Illness:** Several days to a year

**Symptoms:** Dizziness, blurred or double vision, difficulty speaking, swallowing, and breathing, fatigue, weakness, headache.

**Common Cause:** Improperly heat-processed foods, especially home-canned products.

**Foods Implicated:** Low-acid foods that are inadequately heat-processed, packaged anaerobically, and held in the “Danger Zone”.

**Prevention:** Do not use home-canned foods or foods from unapproved sources and discard bulging cans.

# Campylobacteriosis

**Pathogen:** Campylobacter jejuni

**Type:** Bacterial infection

**Oxygen:** Microaerophilic (3-6% oxygen)

**Spore Former:** No

**Incubation Period:** 2 to 5 days

**Duration of Illness:** 2 to 7 days, usually no more than 10 days (relapses common)

**Symptoms:** Diarrhea (watery and bloody), abdominal pain, fever, nausea and vomiting, headache, muscle pain.

**Common Cause:** Often transferred from raw meats to other foods by cross contamination, often via food contact surfaces such as a cutting board or food worker's hands.

**Foods Implicated:** raw milk, raw poultry, raw meats, non-chlorinated water.

**Prevention:** Thoroughly cook food to safe minimum internal temperatures, avoid cross contamination, clean and sanitize food contact surfaces.

# **Ciguatera Fish Poisoning**

**Pathogen:** Ciguatoxin

**Type:** Biochemical intoxication

**Oxygen:**

**Spore Former:** No

**Incubation Period:** 15 minutes to 1 day

**Duration of Illness:** A few days, but may take several weeks or months

**Symptoms:** Dizziness, hot and cold flashes, diarrhea, vomiting, headache.

**Common Cause:** The toxin is transferred to finfish when they eat algae or other fish that contain the toxin.

**Foods Implicated:** Fish, including barracuda, grouper, snapper, jack, mackerel, hogfish, amberjack, blackjack, and triggerfish.

**Prevention:** Purchase seafood from approved dealers. Cooking will not destroy toxin.

# **Clostridium perfringens**

**Pathogen:** Clostridium perfringens

**Type:** Toxin-mediated infection

**Oxygen:** Anaerobic

**Spore Former:** Yes

**Incubation Period:** 8 to 22 hours

**Duration of Illness:** 24 hours

**Symptoms:** Abdominal pain, diarrhea, nausea, dehydration, (fever and vomiting usually absent).

**Common Cause:** Most often attributed to foods that are temperature abused, especially those that have been improperly cooled and reheated.

**Foods Implicated:** Cooked meats and poultry that have been improperly cooled and served cold or improperly reheated, stews, gravy, beans that have been cooled slowly.

**Prevention:** Foods must be cooled down quickly within 4 hours, reheated quickly to 165°F within 2 hours, and then held above 140°F.

## **E. coli O157:H7 enteritis**

**Pathogen:** Escherichia coli O157:H7

**Type:** Bacterial infection or toxin-mediated infection

**Oxygen:** Facultative anaerobic

**Spore Former:** No

**Incubation Period:** 12 to 72 hours

**Duration of Illness:** 1 to 3 days

**Symptoms:** Serious threat for children up to age 16 and the elderly. Severe abdominal pain, vomiting, bloody diarrhea, kidney failure and Hemolytic Uremic Syndrome.

**Common Cause:** Usually transferred to food by contact with intestines during slaughter. Apples used for juice where cattle or deer also grazed. Infected employees that do not properly wash their hands after going to the toilet.

**Foods Implicated:** undercooked beef and other red meats, improperly pasteurized milk, raw finfish,

**Prevention:** Thoroughly cook ground meats to 165°F, make sure employees properly wash their hands, Use only pasteurized apple cider, fruit juice, and milk products.

# Food Allergens

**Type of Illness:** An allergic reaction usually involving the skin, mouth, digestive tract, or airways.

**Symptoms:**

- Skin: hives, rashes, and itching
- Mouth: swelling and itching of the lips and tongue
- Digestive tract: vomiting and diarrhea
- Airways: difficulty breathing, wheezing

**Incubation Period:** As little as 5 minutes

**Common Cause:**

Foods containing:

**Milk**

**Egg**

**Wheat proteins**

**Peanuts**

**Tree nuts**

**Soy**

**Fish**

**Shellfish**

**Prevention:** Avoid eating foods containing these ingredients, proper labeling of packaged and prepared foods.

# Hepatitis A

**Pathogen:** Hepatitis A virus

**Type:** Viral infection

**Oxygen:**

**Spore Former:** No

**Incubation Period:** 15 to 50 days, average 28-30 days

**Duration of Illness:** Several weeks, severe cases may last several months

**Symptoms:** Sudden onset of fever, nausea, vomiting, abdominal pain, fatigue, swelling of liver, and jaundice.

**Common Cause:** Ingestion of food and water that contain the virus.

**Foods Implicated:** Raw and lightly cooked shellfish harvested from polluted waters. Raw vegetables that have been washed with contaminated water. Most Potentially Hazardous Foods that are mishandled by infected food workers.

**Prevention:** Only use potable water when working with food. Handle foods properly and cook them to proper temperatures. Avoid consumption of raw seafood. Make sure food handlers thoroughly wash their hands.

# Listeriosis

**Pathogen:** *Listeria monocytogenes*

**Type:** Bacterial infection

**Oxygen:** Facultative anaerobic

**Spore Former:** No

**Incubation Period:** 1 day to 3 weeks

**Duration of Illness:** Indefinite depending on treatment, can be life threatening for pregnant and immuno-compromised.

**Symptoms:** Flu-like symptoms in healthy adults including nausea, vomiting, headache, fever, chills, and backache. Can be life threatening (septicemia, meningitis, encephalitis, and birth defects) for pregnant woman or immuno-compromised.

**Common Cause:** Cross contamination or undercooked foods.

**Foods Implicated:** Raw milk and cheese, raw meats, refrigerated ready-to-eat meats such as hot dogs, raw vegetables, and seafood.

**Prevention:** Cooked foods thoroughly. Use refrigerated ready-to-eat foods such as cooked turkey breasts, hot dogs, ham, and lunchmeats in a timely manner.

# Norovirus

**Pathogen:** caliciviruses (previously known as “Norwalk-like viruses”)

**Type:** Viral infection

**Oxygen:**

**Spore Former:** No

**Incubation Period:** Usually 1 to 2 days, as early as 12 hours

**Duration of Illness:** 1 to 2 days

**Symptoms:** Gastroenteritis (“stomach flu”) including nausea, vomiting, diarrhea, abdominal pain, headache, low-grade fever, chills, muscle aches.

**Common Cause:** Ingestion of food and water that have been contaminated with feces that contain the virus.

**Foods Implicated:** Raw and lightly cooked shellfish harvested from polluted waters. Raw salad ingredients. Foods that are handled by infected food workers.

**Prevention:** Only use potable water when working with food. Handle foods properly and cook them to proper temperatures. Avoid consumption of raw seafood. Make sure food handlers thoroughly wash their hands.

# Salmonellosis

**Pathogen:** Salmonella spp.

**Type:** Bacterial infection

**Oxygen:** Facultative anaerobic

**Spore Former:** No

**Incubation Period:** 6 to 72 hours, usually 12 to 36 hours

**Duration of Illness:** 2 to 3 days

**Symptoms:** Abdominal pain, headache, nausea, vomiting, fever, diarrhea, dehydration.

**Common Cause:** Commonly through cross contamination when fecal material is transferred to food through contact with raw foods (especially poultry), contaminated food contact surfaces, or infected food workers.

**Foods Implicated:** Raw meat and poultry products, shell eggs, sliced fruits and vegetables, milk, dairy products, and other protein foods.

**Prevention:** Cook foods thoroughly. Clean and sanitize raw food contact surfaces after use. Make sure food workers wash their hands before working with food.

# **Scombroid Poisoning**

**Pathogen:** Scombrototoxin

**Type:** Biochemical intoxication

**Oxygen:**

**Spore Former:** No

**Incubation Period:** A few minutes to 30 minutes after consumption

**Duration of Illness:** 8 to 12 hours

**Symptoms:** Dizziness, burning or tingling sensation in mouth, facial rash or hives, peppery taste in mouth, shortness of breath, headache, itchy, teary eyes.

**Common Cause:** Leaving fish in the Danger Zone.

**Foods Implicated:** Fish, including tuna, anchovies, blue fish, mackerel, amberjack, abalone, and mahi-mahi. Swiss cheese.

**Prevention:** Purchase seafood from approved dealers. Keep “fresh” seafood out of the Danger Zone. Do not accept seafood that is suspected of being thawed and refrozen or temperature abused.

# Shigellosis

**Pathogen:** Shigella

**Type:** Bacterial infection

**Oxygen:** Facultative anaerobic

**Spore Former:** No

**Incubation Period:** 1 to 7 days, usually 1 to 3 days

**Duration of Illness:** 4 to 7 days, can be indefinite depending on when treatment is administered.

**Symptoms:** Diarrhea (sometimes bloody), fever, abdominal cramps, chills, fatigue, and dehydration.

**Common Cause:** Water that is contaminated by fecal material and food and utensils handled by infected food workers.

**Foods Implicated:** Common in ready-to-eat salads (i.e., potato, chicken), milk and dairy products, raw vegetables.

**Prevention:** Cook foods thoroughly, do not allow food workers that have been diagnosed with shigellosis to handle food, make sure food workers wash their hands before working with food, avoid cross contamination, and wash foods with potable water.

# Staphylococcus

**Pathogen:** Staphylococcus aureus

**Type:** Bacterial intoxication

**Oxygen:** Facultative anaerobic

**Spore Former:** No

**Incubation Period:** 1 to 6 hours, usually 2 to 4 hours

**Duration of Illness:** 1 to 2 days

**Symptoms:** Nausea, vomiting, acute abdominal pains, diarrhea, changes in blood pressure and heart rate.

**Common Cause:** Contamination from food worker's hands is the most common way the organism is introduced into foods.

**Foods Implicated:** Cooked ready-to-eat foods, salads, meat, poultry, custards, high-salt foods, milk and dairy products.

**Prevention:** Avoid contact of foods with bare hands, Make sure food workers wash their hands and bandage and glove open wounds on their hands. Heat and cool foods properly.

# **Vibrio spp.**

**Pathogen:** Vibrio vulnificus, Vibrio parahaemolyticus, Vibrio cholera

**Type:** Bacterial infection

**Oxygen:**

**Spore Former:** No

**Incubation Period:** 2 hours to 2 days

**Duration of Illness:** 2 to 3 days, can last longer

**Symptoms:** Headache, fever, chills, diarrhea, vomiting, skin lesions, abdominal pain, septic shock.

**Common Cause:** Consumption of raw or lightly cooked seafood.

**Foods Implicated:** Fish and shellfish, including oysters, clams, mussels, crabs, shrimp, and lobster.

**Prevention:** Buy seafood, especially shellfish, from approved sources. Cook seafood and shellfish to proper temperatures and avoid eating raw or lightly cooked seafood and shellfish. Avoid cross contamination.

**Person's experiencing any of these symptoms after eating these foods should seek medical attention immediately.**