



1 Keeping Food Safe

Foodborne Illnesses

A foodborne illness is a disease transmitted to people through food.

An illness is considered an outbreak when:

- Two or more people have the same symptoms after eating the same food
- An investigation is conducted by state and local regulatory authorities
- The outbreak is confirmed by laboratory analysis

Challenges to Food Safety

Challenges include:

- Time
- Language and culture
- Literacy and education
- Pathogens
- Unapproved suppliers
- High-risk customers
- Staff turnover

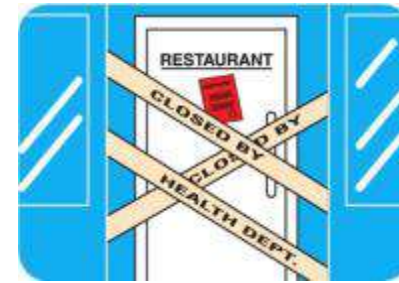


The Costs of Foodborne Illnesses

Costs of a foodborne illness to an operation:



Loss of customers and sales



Loss of reputation



Negative media exposure



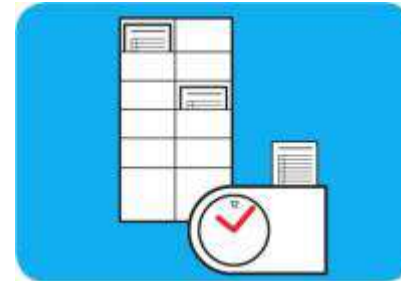
Lowered staff morale

The Costs of Foodborne Illnesses

Costs of a foodborne illness to an operation:



Lawsuits and legal fees



Staff missing work



Increased insurance premiums

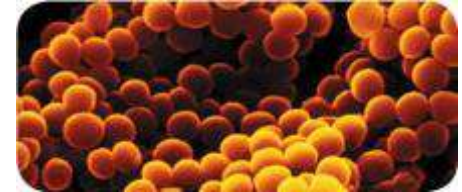


Staff retraining

How Foodborne Illnesses Occur

Unsafe food is the result of contamination:

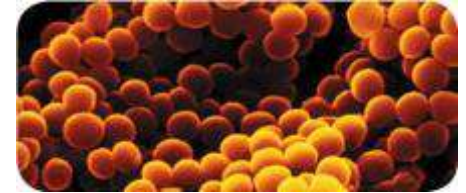
- Biological
- Chemical
- Physical



Contaminants

Biological contaminants:

- Bacteria
- Viruses
- Parasites
- Fungi



Contaminants

Chemical contaminants:

- Cleaners
- Sanitizers
- Polishes



Contaminants

Physical hazards:

- Metal shavings
- Staples
- Bandages
- Glass
- Dirt
- Natural objects (e.g., fish bones in a fillet)



How Food Becomes Unsafe

Five risk factors for foodborne illness:

1. Purchasing food from unsafe sources
2. Failing to cook food correctly
3. Holding food at incorrect temperatures
4. Using contaminated equipment
5. Practicing poor personal hygiene

How Food Becomes Unsafe



Time-temperature abuse



Cross-contamination



Poor personal hygiene



Poor cleaning and sanitizing

How Food Becomes Unsafe

Time-temperature abuse:

- When food has stayed too long at temperatures good for pathogen growth



How Food Becomes Unsafe

Food has been time-temperature abused when:

- It has not been held or stored at correct temperatures
- It is not cooked or reheated enough to kill pathogens
- It is not cooled correctly



How Food Becomes Unsafe

Cross-contamination:

- When pathogens are transferred from one surface or food to another



How Food Becomes Unsafe

Cross-contamination can cause a foodborne illness when:

- Contaminated ingredients are added to food that receives no further cooking
- Ready-to-eat food touches contaminated surfaces
- Contaminated food touches or drips fluids onto cooked or ready-to-eat food
- A food handler touches contaminated food and then touches ready-to-eat food
- Contaminated wiping cloths touch food-contact surfaces



How Food Becomes Unsafe

Poor personal hygiene can cause a foodborne illness when food handlers:

- Fail to wash their hands correctly after using the restroom
- Cough or sneeze on food
- Touch or scratch wounds and then touch food
- Work while sick



How Food Becomes Unsafe

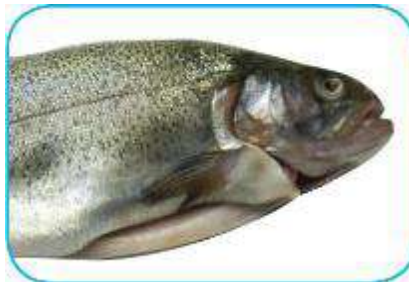
Poor cleaning and sanitizing:

- Equipment and utensils are not washed, rinsed, and sanitized between uses
- Food-contact surfaces are wiped clean instead of being washed, rinsed, and sanitized
- Wiping cloths are not stored in a sanitizer solution between uses
- Sanitizer solutions are not at the required levels to sanitize objects



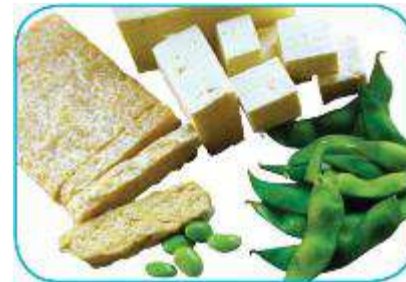
Food Most Likely to Become Unsafe

TCS food:



Food Most Likely to Become Unsafe

TCS food:



Ready-to-Eat Food

Ready-to-eat food is food that can be eaten without further:

- Preparation
- Washing
- Cooking

Ready-to-eat food includes:

- Cooked food
- Washed fruit and vegetables (whole and cut)
- Deli meat
- Bakery items
- Sugar, spices, and seasonings

Populations at High Risk for Foodborne Illnesses

These people have a higher risk of getting a foodborne illness:

- Preschool-age children
- Elderly people
- People with compromised immune systems



Keeping Food Safe

Focus on these measures:

- Purchasing from approved, reputable suppliers
- Controlling time and temperature
- Preventing cross-contamination
- Practicing personal hygiene
- Cleaning and sanitizing





2 Understanding the Microworld

Biological Contamination

Microorganism:

- Small, living organism that can be seen only with a microscope

Pathogen:

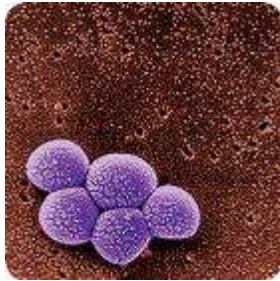
- Harmful microorganism
- Makes people sick when eaten or produces toxins that cause illness

Toxin:

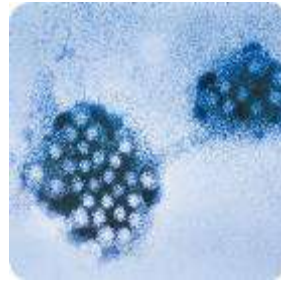
- Poison

Biological Contamination

Four types of pathogens can contaminate food and cause foodborne illness:



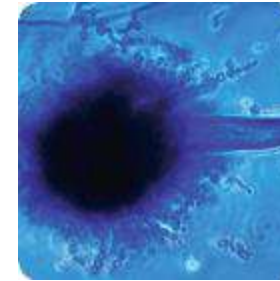
Bacteria



Viruses



Parasites



Fungi

How Contamination Happens

People can contaminate food when:

- They don't wash their hands after using the restroom
- They are in contact with a person who is sick
- They allow ready-to-eat food to touch surfaces that have come in contact with raw meat, seafood, and poultry
- They sneeze or vomit onto food or food-contact surfaces
- They touch dirty food-contact surfaces and equipment and then touch food
- They store food incorrectly



Symptoms of a Foodborne Illness

Common symptoms of foodborne illness:

- Diarrhea
- Vomiting
- Fever
- Nausea
- Abdominal cramps
- Jaundice (yellowing of skin and eyes)

Onset times:

- Depend on the type of foodborne illness
- Can range from 30 minutes to six weeks



The Big Six

These pathogens are highly infectious and can cause severe illness:

- *Salmonella* Typhi
- *Shigella* spp.
- Nontyphoidal *Salmonella* (NTS)
- Shiga toxin-producing *Escherichia coli* (STEC), also known as *E.coli*
- Hepatitis A
- Norovirus

The “Big Six”:

- Are often found in very high numbers in an infected person’s feces
- Can be transferred to food easily
- Can make a person sick in small doses

General Information about Bacteria

Detection:

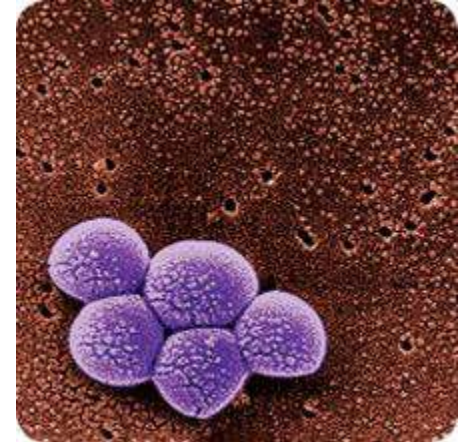
- Cannot be seen, smelled, or tasted

Growth:

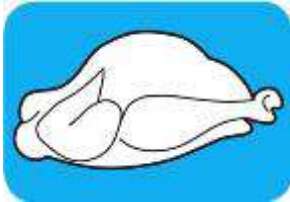
- Will grow rapidly if conditions are correct
- Some can change into spores to keep from dying when they don't have enough food
- Some make toxins in food as they grow and die

Prevention:

- Control time and temperature

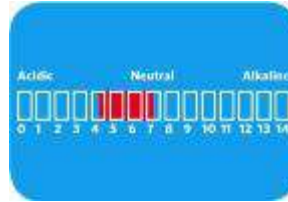


What Bacteria Need to Grow



F

Food



A

Acidity



T

Temperature



T

Time



O

Oxygen



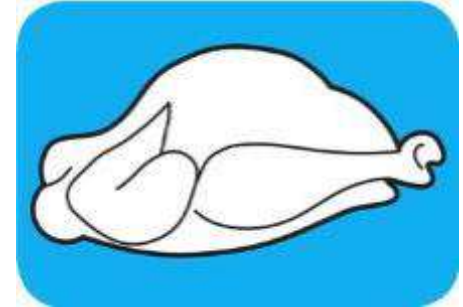
M

Moisture

What Bacteria Need to Grow

Food:

- Most bacteria need nutrients to survive
- TCS food supports the growth of bacteria better than other types of food
 - This includes meat, poultry, dairy products, and eggs



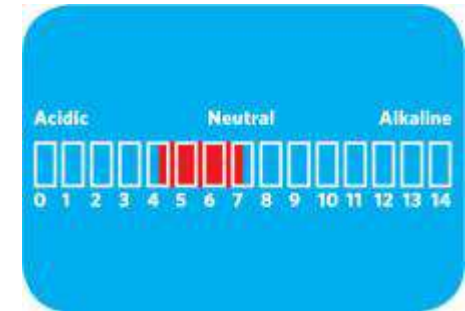
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Food

What Bacteria Need to Grow

Acidity:

- Bacteria grow best in food that contains little or no acid

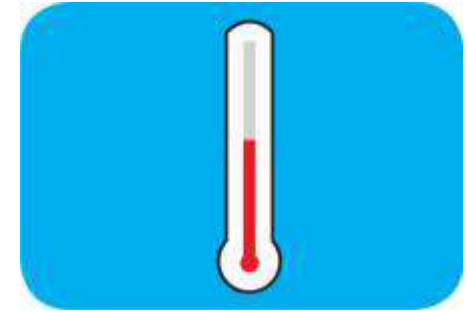


A
Acidity

What Bacteria Need to Grow

Temperature:

- Bacteria grow rapidly between 41°F and 135°F (5°C and 57°C)
 - This range is known as the temperature danger zone
 - Bacteria grow even more rapidly from 70°F to 125°F (21°C to 52°C)
- Bacteria growth is limited when food is held above or below the temperature danger zone



T

Temperature

What Bacteria Need to Grow

Time:

- Bacteria need time to grow
- The more time bacteria spend in the temperature danger zone, the more opportunity they have to grow to unsafe levels



T
Time

What Bacteria Need to Grow

Oxygen:

- Some bacteria need oxygen to grow, while others grow when oxygen isn't there



Oxygen

What Bacteria Need to Grow

Moisture:

- Bacteria grow well in food with high levels of moisture
- a_w = water activity; the amount of moisture available in food for bacterial growth
- a_w scale ranges from 0.0 to 1.0
- Water has a water activity of 1.0



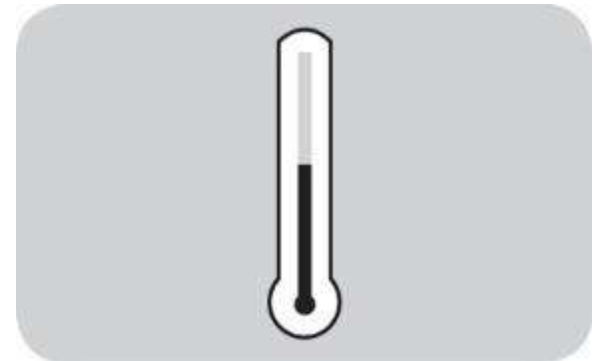
M

Moisture

What Bacteria Need to Grow

The conditions you can control:

- Temperature
 - Keep TCS food out of the temperature danger zone
- Time
 - Limit how long TCS food spends in the temperature danger zone



Major Foodborne Bacteria

Bacteria:

- *Bacillus cereus*
- *Listeria monocytogenes*
- Shiga toxin-producing *E. coli*
- *Campylobacter jejuni*
- *Clostridium perfringens*
- *Clostridium botulinum*
- Nontyphoidal *Salmonella*
- *Shigella* spp.
- *Staphylococcus aureus*
- *Vibrio vulnificus*

Major Foodborne Bacteria

Controlling time and temperature can keep these bacteria from causing a foodborne illness:

- *Bacillus cereus*
- *Listeria monocytogenes*
- Shiga toxin-producing *E. coli*
- *Campylobacter jejuni*
- *Clostridium perfringens*
- *Clostridium botulinum*

Bacillus cereus



Bacteria: *Bacillus cereus* (Diarrhea Illness)

Illness: *Bacillus cereus* gastroenteritis

Commonly Linked Food

Most Common Symptoms

Cooked vegetables

Watery diarrhea

Meat products

No vomiting

Milk

Bacillus cereus



Bacteria: *Bacillus cereus* (Vomiting Illness)

Illness: *Bacillus cereus* gastroenteritis

Commonly Linked Food

Cooked rice dishes including:

- Fried rice
- Rice pudding

Most Common Symptoms

Nausea

Vomiting

Bacillus cereus

Most important prevention measure:

- Control time and temperature

Other prevention measures:

- Cook food to minimum internal temperatures
- Hold food at the correct temperatures
- Cool food correctly

Listeria monocytogenes



Bacteria: *Listeria monocytogenes*

Illness: Listeriosis

Commonly Linked Food

Most Common Symptoms

Raw meat

Pregnant women:

Miscarriage

Ready-to-eat food such as:

- Deli-meat
- Hot dogs
- Soft cheese

Newborns:

Sepsis

Pneumonia

Meningitis

2-21 Unpasteurized dairy products

Listeria monocytogenes

Most important prevention measure:

- Control time and temperature

Other prevention measures:

- Throw out any product that has passed its use-by or expiration date
- Cook raw meat to minimum internal temperatures
- Prevent cross-contamination between raw or undercooked food and ready-to-eat food
- Avoid using unpasteurized dairy products

Shiga toxin-producing *E. coli*



Bacteria: Shiga toxin-producing *Escherichia coli*, also known as *E. coli*, including: O157:H7, O26:H11, O111:H8, and O158:NM

Illness: Hemorrhagic colitis

Commonly Linked Food

Most Common Symptoms

Ground beef (raw and undercooked)

Diarrhea (becomes bloody)

Contaminated produce

Abdominal cramps

Kidney failure (in severe cases)

Shiga toxin-producing *E. coli*

Most important prevention measure:

- Control time and temperature

Other prevention measures:

- Cook food, especially ground beef, to minimum internal temperatures
- Purchase produce from approved, reputable suppliers
- Prevent cross-contamination between raw meat and ready-to-eat food
- Keep staff with diarrhea who have been diagnosed with hemorrhagic colitis out of the operation

Campylobacter jejuni



Bacteria: *Campylobacter jejuni*

Illness: Campylobacteriosis

Commonly Linked Food

Most Common Symptoms

Poultry

Diarrhea (May be watery or bloody)

Water contaminated with the bacteria

Abdominal cramps

Stews/gravies

Vomiting

Headaches

Campylobacter jejuni

Most important prevention measure:

- Control time and temperature

Other prevention measures:

- Cook food, particularly poultry, to required minimum internal temperatures
- Prevent cross-contamination between raw poultry and ready-to-eat food

Clostridium perfringens



Bacteria: *Clostridium perfringens*

Illness: *Clostridium perfringens* gastroenteritis

Commonly Linked Food	Most Common Symptoms
Meat	Diarrhea
Poultry	Severe abdominal pain
Dishes made with meat and poultry, such as stews and gravies	

Clostridium perfringens

Most important prevention measure:

- Control time and temperature

Other prevention measures:

- Cool and reheat food correctly
- Hold food at the correct temperatures

Clostridium botulinum



Bacteria: *Clostridium botulinum*

Illness: Botulism

Commonly Linked Food

Most Common Symptoms

Incorrectly canned food

Initially:

Nausea and vomiting

Reduced-oxygen packaged (ROP) food

Later:

Weakness

Temperature-abused vegetables, such as baked potatoes

Double vision

Untreated garlic-and-oil mixtures

Difficulty speaking and swallowing

Clostridium botulinum

Most important prevention measure:

- Control time and temperature

Other prevention measures:

- Hold, cool, and reheat food correctly
- Inspect canned food for damage

Major Foodborne Bacteria

Preventing cross-contamination can keep these bacteria from causing a foodborne illness:

- Nontyphoidal *Salmonella*
- *Salmonella* Typhi

Nontyphoidal *Salmonella*



Bacteria: Nontyphoidal *Salmonella*

Illness: Salmonellosis

Commonly Linked Food

Most Common Symptoms

Poultry and eggs

Diarrhea

Dairy products

Abdominal cramps

Produce

Vomiting

Fever

Nontyphoidal *Salmonella*

Most important prevention measure:

- Prevent cross-contamination

Other prevention measures:

- Cook poultry and eggs to minimum internal temperatures
- Prevent cross-contamination between poultry and ready-to-eat food
- Keep food handlers who are vomiting or have diarrhea and have been diagnosed with salmonellosis out of the operation

Salmonella Typhi



Bacteria: *Salmonella Typhi*

Illness: Typhoid Fever

Commonly Linked Food

Ready-to-eat food

Beverages

Most Common Symptoms

High fever

Weakness

Abdominal pain

Headache

Loss of appetite

Rash

Salmonella Typhi

Most important prevention measure:

- Prevent cross-contamination

Other prevention measures:

- Exclude food handlers who have been diagnosed with an illness caused by *Salmonella Typhi* from the operation
- Wash hands
- Cook food to minimum internal temperatures

Major Foodborne Bacteria

Practicing personal hygiene can keep these bacteria from causing a foodborne illness:

- *Shigella* spp.
- *Staphylococcus aureus*

Shigella spp.



Bacteria: *Shigella* spp.

Illness: Shigellosis

Commonly Linked Food

Food easily contaminated by hands, including:

Salads containing TCS food (potato, tuna, shrimp, macaroni, chicken)

Food in contact with contaminated water, such as produce

Most Common Symptoms

Bloody diarrhea

Abdominal pain and cramps

Fever (occasionally)



Shigella spp.

Most important prevention measure:

- Practice personal hygiene

Other prevention measures:

- Exclude food handlers who have diarrhea and have been diagnosed with an illness caused by *Shigella* spp. from the operation
- Wash hands
- Control flies inside and outside the operation

Staphylococcus aureus



Bacteria: *Staphylococcus aureus*

Illness: Staphylococcal gastroenteritis

Commonly Linked Food

Most Common Symptoms

Food requiring handling during prepping, including:

Salads containing TCS food (egg, tuna, chicken, macaroni)

Nausea

Deli meat

Vomiting and retching

Abdominal cramps

Staphylococcus aureus

Most important prevention measure:

- Practice personal hygiene

Other prevention measures:

- Wash hands, particularly after touching the hair, face, or body
- Cover wounds on hands and arms
- Hold, cool, and reheat food correctly

Major Foodborne Bacteria

Purchasing food from approved, reputable suppliers can keep these bacteria from causing a foodborne illness:

- *Vibrio vulnificus*
- *Vibrio parahaemolyticus*

Vibrio vulnificus & *Vibrio parahaemolyticus*



Bacteria: *Vibrio vulnificus*
Vibrio gastroenteritis
vulnificus primary septicemia

Illness:
Vibrio

Commonly Linked Food

Most Common Symptoms

Oysters from contaminated water

Diarrhea

Abdominal cramps and nausea

Vomiting

Low-grade fever and chills

Vibrio vulnificus & *Vibrio parahaemolyticus*

Most important prevention measure:

- Purchase from approved, reputable suppliers

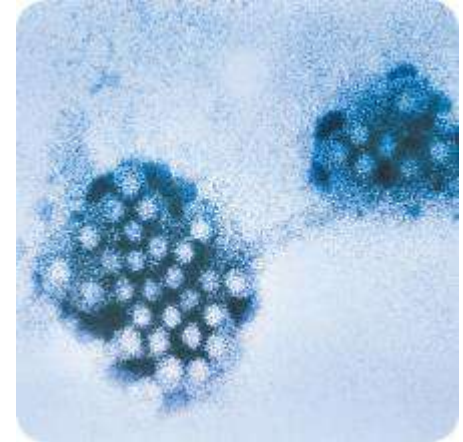
Other prevention measures:

- Cook oysters to minimum internal temperatures

General Information About Viruses

Location:

- Carried by human beings and animals
 - Require a living host to grow
 - Do not grow in food
 - Can be transferred through food and remain infectious in food



Sources:

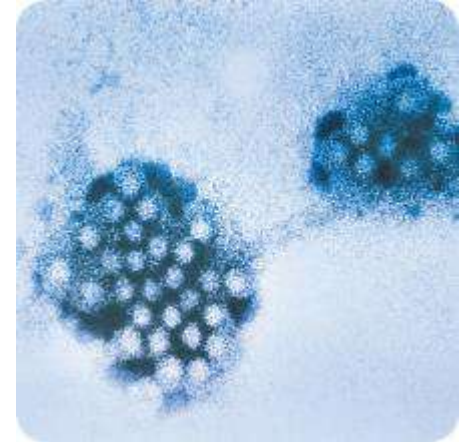
- Food, water, or any contaminated surface
- Typically occur through fecal-oral routes

General Information About Viruses

Transfer:

- Viruses can be transferred from
 - Person to person
 - People to food
 - People to food-contact surfaces

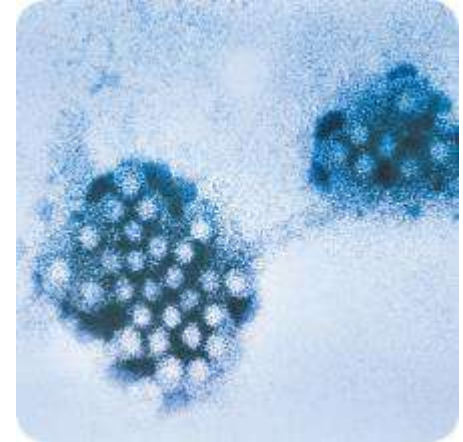
- People
 - Carry viruses in their feces
 - Can transfer them to their hands after using the restroom



General Information About Viruses

Prevention:

- Not destroyed by normal cooking temperatures
- Good personal hygiene must be practiced when handling food and food-contact surfaces
- Quick removal and cleanup of vomit is important



Major Foodborne Viruses

Practicing personal hygiene can keep these viruses from causing a foodborne illness:

- Hepatitis A
- Norovirus

Hepatitis A



Virus: Hepatitis A
Illness: Hepatitis A

Commonly Linked Food

Most Common Symptoms

Ready-to-eat food

Fever (mild)

Shellfish from contaminated water

General Weakness

Nausea

Abdominal pain

Jaundice (appears later)

Hepatitis A

Most important prevention measure:

- Practicing personal hygiene

Other prevention measures:

- Exclude staff who have been diagnosed with hepatitis A from the operation
- Exclude staff who have jaundice from the operation
- Wash hands
- Avoid bare-hand contact with ready-to-eat food
- Purchase shellfish from approved, reputable suppliers

Norovirus



Virus: Norovirus

Illness: Norovirus gastroenteritis

Commonly Linked Food

Most Common Symptoms

Ready-to-eat food

Vomiting

Shellfish from contaminated water

Diarrhea

Nausea

Abdominal cramps

Most important prevention measure:

- Practicing personal hygiene

Other prevention measures:

- Exclude staff who are vomiting or have diarrhea and have been diagnosed with Norovirus from the operation
- Wash hands
- Avoid bare-hand contact with ready-to-eat food
- Purchase shellfish from approved, reputable suppliers

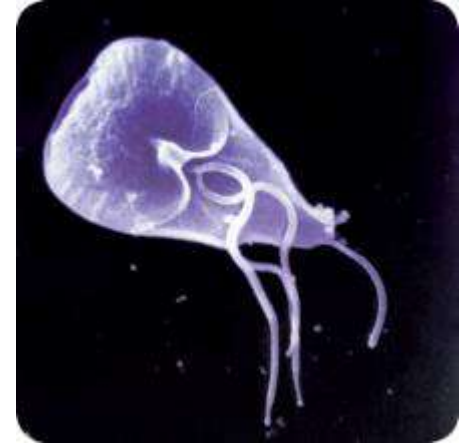
Characteristics of Parasites

Location:

- Require a host to live and reproduce

Source:

- Seafood, wild game, and food processed with contaminated water, such as produce



Characteristics of Parasites

Prevention:

- Purchase food from approved, reputable suppliers
- Cook food to required minimum internal temperatures
- Fish that will be served raw or undercooked must be frozen correctly by the manufacturer



Major Foodborne Parasites

Purchasing from approved, reputable suppliers can keep these parasites from causing a foodborne illness:

- *Anisakis simplex*
- *Cryptosporidium parvum*
- *Giardia duodenalis*
- *Cyclospora cayetanensis*

Anisakis simplex



Parasite: *Anisakis simplex*

Illness: Anisakiasis

Commonly Linked Food

Raw and undercooked fish, including:

- Herring
- Cod
- Pacific salmon
- Halibut
- Mackerel

Most Common Symptoms

Tingling in throat

Coughing up worms

Anisakis simplex

Most important prevention measure:

- Purchase from approved, reputable suppliers

Other prevention measures:

- Cook fish to minimum internal temperatures
- If serving raw or undercooked fish, purchase sushi-grade fish that has been frozen to the correct time-temperature requirements

Cryptosporidium parvum



Parasite: *Cryptosporidium parvum*

Illness: Cryptosporidiosis

Commonly Linked Food

Most Common Symptoms

Contaminated water

Watery diarrhea

Produce

Abdominal cramps

Nausea

Weight loss

Cryptosporidium parvum

Most important prevention measure:

- Purchase from approved, reputable suppliers

Other prevention measures:

- Use correctly treated water
- Keep food handlers with diarrhea out of the operation
- Wash hands

Giardia duodenalis



Parasite: *Giardia duodenalis*
(*G. lamblia* or *G. Intestinalis*)

Illness: Giardiasis

Commonly Linked Food

Incorrectly treated water

Produce

Most Common Symptoms

Initially

Fever

Later

Diarrhea

Abdominal cramps

Nausea

Giardia duodenalis

Most important prevention measure:

- Purchase from approved, reputable suppliers

Other prevention measures:

- Use correctly treated water
- Keep food handlers with diarrhea out of the operation
- Wash hands

Cyclospora cayetanensis



Parasite: *Cyclospora cayetanensis*

Illness: Cyclosporiasis

Commonly Linked Food

Most Common Symptoms

Incorrectly treated water

Nausea

Produce such as berries, lettuce, or basil

Abdominal cramps

Mild fever

Diarrhea alternating with constipation

Loss of weight

Loss of appetite

Cyclospora cayetanensis

Most important prevention measure:

- Purchase from approved, reputable suppliers

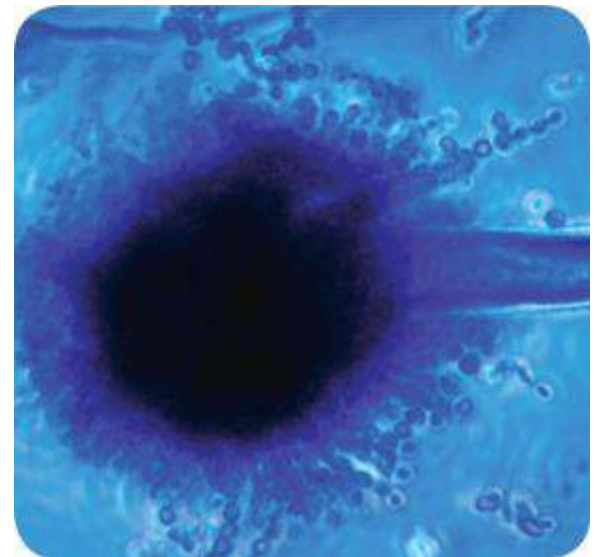
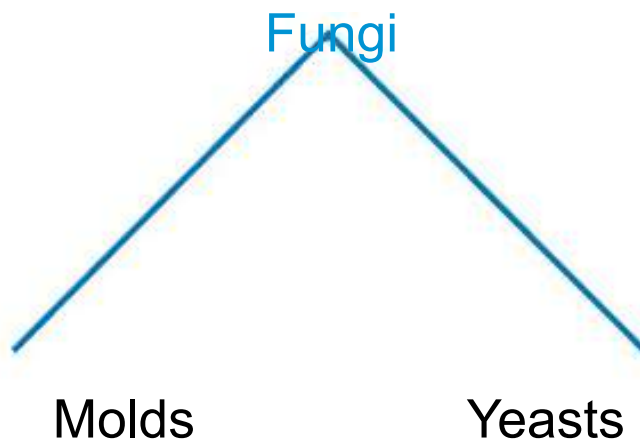
Other prevention measures:

- Purchase produce from approved, reputable suppliers
- Keep food handlers with diarrhea out of the operation
- Wash hands

Fungi

Fungi:

- Commonly cause food spoilage and sometimes illness



Basic characteristics of mold:

- Spoil food and sometimes cause illness
- Some produce toxins
- Grow well in almost any condition, especially in acidic food with low water activity
- Are only slowed not destroyed by cooler or freezer temperatures



Prevention:

- Throw out all moldy food unless the mold is a natural part of the food

Yeast

Basic characteristics of yeast:

- Can spoil food quickly
- May produce a smell or taste of alcohol as it spoils food
- May look like a white or pink discoloration or slime and may bubble
- Grow well in acidic food with little moisture

Prevention:

- Food containing yeast should be thrown out



Biological Toxins

Origin:

- Naturally occur in certain plants, mushrooms, and seafood

Seafood toxins:

- Produced by pathogens found on certain fish
- Occur in certain fish that eat smaller fish that have consumed the toxin



Major Fish Toxins

Purchasing from approved, reputable suppliers can keep these fish toxins from causing a foodborne illness:

- Histamine
- Ciguatoxin

Histamine



Toxin: Histamine

Illness: Scombroid poisoning

Commonly Linked Food

Tuna

Bonito

Mackerel

Mahimahi

Most Common Symptoms

Initially

Reddening of the face and neck

Sweating

Headache

Burning or tingling sensation in the mouth or throat

Possible later

Most important prevention measure:

- Purchase from approved, reputable suppliers

Other prevention measures:

- Prevent time-temperature abuse during storage and preparation

Ciguatoxin



Toxin: Ciguatoxin

Illness: Ciguatera fish poisoning

Commonly Linked Food

Predatory tropical reef fish from Pacific Ocean, Western Indian Ocean, and Caribbean Sea:

- Barracuda
- Grouper
- Jacks
- Snapper

Most Common Symptoms

Reversal of hot and cold sensations

Nausea

Vomiting

Tingling in fingers, lips, or toes

Joint and muscle pain



Most important prevention measure:

- Purchase predatory tropical reef fish from approved, reputable suppliers

Major Shellfish Toxins

Purchasing from approved, reputable suppliers can keep these shellfish toxins from causing a foodborne illness:

- Saxitoxin
- Brevetoxin
- Domoic acid

Saxitoxin



Toxin: Saxitoxin

Illness:

Paralytic shellfish poisoning (PSP)

Commonly Linked Food

Shellfish found in colder waters such as those of the Pacific and New England coasts:

- Clams
- Mussels
- Oysters
- Scallops

Most Common Symptoms

Numbness

Tingling in mouth, face, arms, and legs

Dizziness

Nausea

Vomiting

Diarrhea

Most important prevention measure:

- Purchase shellfish from approved, reputable suppliers

Brevetoxin



Toxin: Brevetoxin

Illness:

Neurotoxic shellfish poisoning (NSP)

Commonly Linked Food

Shellfish in warmer waters of west coast of Florida, Gulf of Mexico, and Caribbean Sea:

- Clams
- Mussels
- Oysters

Most Common Symptoms

Tingling and numbness of the lips, tongue, and throat

Dizziness

Reversal of hot and cold sensations

Vomiting

Diarrhea

Most important prevention measure:

- Purchase shellfish from approved, reputable suppliers

Domoic acid



Toxin: Domoic acid

Illness:

Amnesic shellfish poisoning (ASP)

Commonly Linked Food

Shellfish found in coastal waters of Pacific Northwest and east coast of Canada:

- Clams
- Mussels
- Oysters
- Scallops

Most Common Symptoms

Initially

Vomiting
Diarrhea
Abdominal pain

Possibly later

Confusion
Memory loss
Disorientation
Seizure
Coma

Most important prevention measure:

- Purchase shellfish from approved, reputable suppliers

Mushroom Toxins

Foodborne illnesses linked with mushrooms:

- Are caused by eating toxic wild mushrooms
- Occur when toxic mushrooms are mistaken for edible ones
- Can be prevented by purchasing from approved, reputable suppliers



Foodborne illnesses linked with plant toxins:

- Usually happen when plants are purchased from unapproved suppliers
- Can happen when certain plants aren't cooked correctly (i.e., undercooked kidney beans)
- Can be prevented by purchasing plants from approved, reputable suppliers



3 Contamination, Food Allergens, and Foodborne Illness

Physical Contaminants

Sources:

- Common objects that get into food
 - Metal shavings from cans
 - Wood
 - Fingernails
 - Staples
 - Bandages
 - Glass
 - Jewelry
 - Dirt
- Naturally occurring objects such as fruit pits and bones



Physical Contaminants

Symptoms:

- Mild to fatal injuries are possible
- Cuts, dental damage, and choking
- Bleeding and pain

Prevention:

- Purchase food from approved, reputable suppliers
- Closely inspect food received
- Take steps to prevent physical contamination, including practicing good personal hygiene

Chemical Contaminants

Sources:

- Cleaners, sanitizers, polishes, machine lubricants, and pesticides
- Certain types of kitchenware and equipment (items made from pewter, copper, zinc, and some types of painted pottery)
- Deodorizers, first-aid products, and health and beauty products (hand lotions, hairsprays, etc.)



Chemical Contaminants

Symptoms:

- Vary depending on chemical consumed
- Most illnesses occur within minutes
- Vomiting and diarrhea are typical

If an illness is suspected:

- Call the emergency number in your area
- Call the Poison Control number
- Consult the chemical's MSDS

Chemical Contaminants

Prevention:

- Only use chemicals approved for use in foodservice operations
- Purchase chemicals from approved, reputable suppliers
- Store chemicals away from prep areas, food-storage areas, and service areas
 - Chemicals must be separated from food and food-contact surfaces by spacing and partitioning
- Chemicals must **NEVER** be stored above food or food-contact surfaces
- Use chemicals for their intended use and follow manufacturer's directions



Chemical Contaminants

Prevention:

- Only handle food with equipment and utensils approved for foodservice use
- Make sure the manufacturers' labels on original chemical containers are readable
- Keep MSDS current, and make sure they are accessible to staff at all times
- Follow the manufacturer's directions and local regulatory requirements when throwing out chemicals



The Deliberate Contamination of Food

Groups who may attempt to contaminate food:

- Terrorists or activists
- Disgruntled current or former staff
- Vendors
- Competitors

FDA defense tool:

- A.L.E.R.T.

The Deliberate Contamination of Food

- Assure** Make sure products received are from safe sources
- Look** Monitor the security of products in the facility
- Employees** Know who is in your facility
- Reports** Keep information related to food defense accessible
- Threat** Develop a plan for responding to suspicious activity or a threat to the operation

Food Allergens

Food allergen:

- A protein in a food or ingredient some people are sensitive to
- These proteins occur naturally
- When an enough of an allergen is eaten, an allergic reaction can occur



Allergy Symptoms

Allergy symptoms:

- Nausea
- Wheezing or shortness of breath
- Hives or itchy rashes
- Swelling of various parts of the body, including the face, eyes, hands, or feet
- Vomiting and/or diarrhea
- Abdominal pain

Allergic reactions:

- Symptoms can become serious quickly
- A severe reaction, called anaphylaxis, can lead to death

Food Allergens

The Big Eight food allergens:

- Milk
- Eggs
- Fish
- Crustacean shellfish, including lobster, shrimp, and crab
- Wheat
- Soy
- Peanuts
- Tree nuts, such as almonds, walnuts, and pecans



Food Allergens

Know How to Read Food Labels

- Check food labels for allergens

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

INGREDIENTS: CHICKEN BROTH, CONTAINS OF THE FOLLOWING: SALT, DEXTROSE, MONOSODIUM GLUTAMATE, HYDROLYZED V NATURAL FLAVORS, AUTOLYZED YEAST EXT JUICE CONCENTRATE, MONO AND DIGLYCER GUM, ONION JUICE CONCENTRATE.

CONTAINS: WHEAT.

Preventing Allergic Reactions

Service staff:

- Describe menu items to guests and identify any allergens in the item
- Suggest menu items without the allergens
- Clearly mark the guest's order for kitchen and service staff
- Deliver food separately to prevent cross-contact



Preventing Allergic Reactions

Kitchen staff:

- Avoid cross-contact
 - Do **NOT** cook different types of food in the same fryer oil
 - Do **NOT** put food on surfaces that have touched allergens



Preventing Allergic Reactions

Kitchen staff:

- Avoid cross-contact
 - Check recipes and ingredient labels
 - Wash, rinse, and sanitize cookware, utensils, and equipment before preparing an allergen special order
 - Make sure the allergen doesn't touch anything for customers with food allergies (food, beverages, utensils, etc.)
 - Wash your hands and change gloves before prepping food
 - Label food packaged on-site for retail use

