

Bacterial disease

Bacterial diseases include any type of illness caused by bacteria. Bacteria are a type of microorganism, which are tiny forms of life that can only be seen with a microscope. Other types of microorganisms include viruses, some fungi, and some parasites.

Millions of bacteria normally live on the skin, in the intestines, and on the genitalia. The vast majority of bacteria do not cause disease, and many bacteria are actually helpful and even necessary for good health. These bacteria are sometimes referred to as “good bacteria” or “healthy bacteria.”

Harmful bacteria that cause bacterial infections and disease are called pathogenic bacteria. Bacterial diseases occur when pathogenic bacteria get into the body and begin to reproduce and crowd out healthy bacteria, or to grow in tissues that are normally sterile. Harmful bacteria may also emit toxins that damage the body. Common pathogenic bacteria and the types of bacterial diseases they cause include:

- ***Escherichia coli* and *Salmonella*** cause food poisoning.
- ***Helicobacter pylori*** cause gastritis and ulcers.
- ***Neisseria gonorrhoeae*** causes the sexually transmitted disease gonorrhea.
- ***Neisseria meningitidis*** causes meningitis.
- ***Staphylococcus aureus*** causes a variety of infections in the body, including boils, cellulitis, abscesses, wound infections, toxic shock syndrome, pneumonia, and food poisoning.
- ***Streptococcal bacteria*** cause a variety of infections in the body, including pneumonia, meningitis, ear infections, and strep throat.

Bacterial diseases are contagious and can result in many serious or life-threatening complications, such as blood poisoning (bacteremia), kidney failure, and toxic shock syndrome.

Symptoms

What are the symptoms of bacterial diseases?

Symptoms of bacterial diseases vary depending on the type of bacterial infection, the area of the body that is infected, and other factors, such as the patient’s age and health history. The symptoms of bacterial diseases can also resemble symptoms of other diseases, such as colitis, influenza, and viral infections. The classic symptom of a bacterial infection is a fever, although not all people with a bacterial infection will have a fever.

Bacterial disease symptoms can include:

- Bloody urine and painful, frequent urination
- Diarrhea
- Flu-like symptoms (fatigue, fever, sore throat, headache, cough, aches and pains)
- Irritability
- Nausea and vomiting
- Pain such as joint, ear or abdominal pain
- Rashes, lesions and abscesses
- Stiff neck
- Weakness

Causes

What causes bacterial diseases?

Bacterial diseases are caused by harmful bacteria (pathogenic bacteria). The vast majority of bacteria do not cause disease, and many bacteria are actually helpful and even necessary for good health. Bacterial diseases occur when pathogenic bacteria get into an area of the body that is normally sterile, such as the bladder, or when they crowd out the helpful bacteria in places such as the intestines, vagina or mouth. Less common, bacterial infections can occur when healthy bacteria multiply uncontrollably.

Various ways pathogenic bacteria can enter the body

Pathogenic bacteria can enter the body through a variety of means including:

- Contamination of bites, cuts, rashes, abrasions and other breaks in the skin, gums and tissues
- Eating contaminated food
- Getting bitten by an infected insect
- Having sexual contact with an infected person
- Inhaling contaminated air-borne droplets into the nose and lungs
- Using needles for tattooing or drug use
- Through the eyes, ears or urethra
- Touching infected feces or body fluids, and not washing your hands before eating or touching your mouth, eyes or nose

Once bacteria enter the body, a healthy immune system will recognize the bacteria as foreign invaders and try to kill or stop the bacteria from reproducing. However, even in a healthy person, the body is not always able to stop the bacteria from multiplying and spreading. As the harmful bacteria reproduce, they can crowd out healthy bacteria and microorganisms and emit toxins that damage the cells of the body.

What are the risk factors for bacterial diseases?

Bacterial diseases can occur in any age group or population, but a number of factors increase the risk of developing bacterial diseases. Not all people with risk factors will get bacterial diseases. Risk factors for bacterial diseases include:

- Being an infant, child or older adult
- Eating eggs or meats that are raw or undercooked
- Eating expired foods, or eating leftovers that have been stored for more than two to three days
- Having a genetic predisposition to bacterial infection
- Having a compromised immune system due to an immunodeficiency disorder, HIV/AIDS, diabetes, cancer or cancer treatment, kidney disease, or from taking steroid medications
- Having a chronic disease
- Malnutrition
- Not washing hands frequently, especially after using the bathroom, touching pet feces, handling reptiles, or touching raw foods or foods contaminated with bacteria
- Significant exposure to a person with a bacterial disease

Reducing your risk of bacterial diseases

You can lower your risk of developing or transmitting bacterial diseases by :

- Avoiding contact with a person who has a bacterial disease or its symptoms, such as fever, vomiting or diarrhea
- Covering your mouth and nose with a tissue when sneezing or coughing, then washing your hands
- Defrosting foods in the refrigerator or microwave, not on the counter
- Refrigerating leftovers right away and eating them within two to three days unless they have been frozen
- Eating a healthy diet that is high in whole grains, fruits and vegetables and contains adequate low-fat protein and low-fat dairy products or other calcium sources
- Getting enough rest and minimizing stress
- Getting recommended vaccines for bacterial diseases, such as meningitis, pneumonia, tetanus and rabies
- Seeking regular medical care and following your treatment plan for a chronic disease
- Throwing out expired food or perishable food that has been sitting at room temperature for two hours or longer
- Using antibacterial products to clean surfaces, such as computer keyboards, telephones and sinks
- Washing your hands after using the bathroom and after contact with pet feces, reptiles, dirty diapers, raw foods, and people who are ill
- Washing plates, utensils, and cutting boards that have been exposed to raw meats or poultry in hot soapy water
- Wearing long pants and sleeves, and using insect repellent when in tall grass or wooded areas

Treatments

How are bacterial diseases treated?

Bacterial diseases are treated with antibiotics. Antibiotics work by killing the harmful bacteria or by stopping them from reproducing and spreading. Different types of antibiotics are effective for treating specific types of bacteria. Antibiotics may be given orally, intravenously, or by intramuscular injection, depending on the type and severity of bacterial disease and other factors.

Foodborne & Waterborne Diseases

Causes

Foodborne and waterborne illnesses result from the failure to control an identified (or unidentified) hazard.

In food and water, it is an unacceptable contamination that causes the food or water to be unfit for human consumption.

A hazard falls into three categories:

- physical
- chemical
- biological.

Foodborne disease has the potential to be caused by all three of these categories of hazards.

Biological foodborne illness is by far the most common occurrence of foodborne illness and is caused by a large number of pathogenic (disease-causing) microorganisms (germs), including viruses, bacteria, protozoa, parasites and fungi. A very common virus that causes foodborne illness is norovirus (people often call illness caused by this virus "stomach flu", although it is not really a true "flu", which is a respiratory illness). Salmonella bacteria also commonly cause foodborne illness.

Chemical illness arises from substances that do not belong in food, but can contaminate it through carelessness or malicious intent or simply by contact with the food. Pesticides and cleaners are some of the chemicals that can cause harm through food. For example, bleach can cause poisoning and should only be kept in a clearly marked container to avoid contaminating food. Paralytic shellfish poisoning (PSP) toxin in mussels, clams and oysters is an example of a chemical hazard that can cause illness.

Physical foodborne illness (injury, in this case) results from foreign objects in food like wood splinters, glass and metal fragments, pebbles or bone fragments.

Waterborne disease falls into two of these categories

- chemical
- biological.

Many of the pathogens that cause foodborne illness also cause waterborne disease. Because water systems often serve large numbers of people, outbreaks of disease can also be very large.

Symptoms

The symptoms of physical and chemical causes of illness and injury will vary considerably.

Foreign objects in food can cause broken teeth or internal bleeding.

Chemicals in food or water can cause burns to the stomach and intestines, neurological (nerve) effects such as tingling, numbness and many other symptoms, or chronic (long term) problems such as cancer.

Biological causes will affect primarily the stomach and/or intestines, since food and water are taken internally, and can include:

- nausea
- vomiting
- cramps
- diarrhea
- fever
- In certain types of foodborne illness, more severe life-threatening symptoms or long term symptoms may show up. A long term symptom resulting from some E. coli O157:H7 infections is kidney damage, called hemolytic-uremic syndrome (HUS).

Prevention

Food

eat only food that is from approved sources. Follow the four basic rules of

- clean
- separate (don't cross-contaminate)

- cook
- chill

Food spoilage

Food spoilage is defined as damage or injury to food rendering it unsuitable for human consumption. Food must be considered spoiled if it is contaminated with pathogenic microorganisms or various poisonous agents, such as pesticides, heavy metals etc.

Causes of food spoilage

1. Growth and activity of microorganisms Bacteria, yeasts and molds are microorganisms that cause food spoilage. They produce various enzymes that decompose the various constituents of food.
2. Enzyme activity: Action of enzymes found inherently in plant or animal tissues start the decomposition of various food components after death of plant or animal.
3. Chemical reactions: These are reactions that are not catalysed by enzymes.,e.g. oxidation of fat
4. Vermin. Vermin includes ants, rats, cockroaches, mice, birds, larval stages of some insects. Vermin are important due to: (i). Aesthetic aspect of their presence, (ii) Possible transmission of pathogenic agents, (iii). Consumption of food.
5. Physical changes. These include those changes caused by freezing, burning, drying, pressure, etc.

Bacteria, yeasts and molds are the major causes of food spoilage. They produce various enzymes that decompose the various constituents of food. Molds are the major causes of spoilage of foods with reduced water activity e.g dry cereals and cereal products. Bacteria spoil foods with relatively high water activity such as milk and products.

Sources of microorganisms in food

The primary sources of microorganisms in food include: 1. Soil and water 2. Plant and plant products 3. Food utensils 4. Intestinal tract of man and animals 5. Food handlers 6. Animal hides and skins 7. Air and dust

Food Preservation Definition

Food preservation is the technique to prevent food spoilage, food poisoning, and microbial contamination in food.

Food Preservation

Food preservation is one of the methods to protect food from unwanted microbial growth. After the food is produced, we store and protect by covering the rice and curry with lids to keep away flies and other insects. By this, we are protecting it from any infection caused by them. This is a short-term condition. Food preservation, on the other hand, is done to preserve food for a longer time.

The important objectives of food preservation:

1. To prevent microbial contamination.
2. To kill pathogens.
3. To minimise food spoilage and food poisoning.

Food Preservation Methods

Chemicals and other natural substances were used for preservation. These substances are known as preservatives.

Chemical Method

Salt and edible oils are two main preservatives which are used since ages to prevent microbial growth. This is why we add extra oil to pickles. Preservation by salt is known as salting. Salting helps to preserve fruits for a long term. Meats and fishes can also be preserved by salting.

Other synthetic preservatives include vinegar, sodium benzoate, sodium metabisulphite, etc.

Sugar

Sugar is another common preservative used in jams and jellies. Sugar is a good moisture absorbent. By reducing moisture content, it restrains the microbial growth.

Heat and Cold Methods

Boiling and refrigeration prevent around 70 percent of microbial growth. Boiling kills the microorganisms that cannot tolerate extreme temperatures. Thus, it helps in food preservation.

Refrigerators have very low temperatures. Since microbes do not get optimum temperature they need for growth, their growth is inhibited. Pasteurization developed by Louis Pasteur is used until today to preserve milk.

Smoking

Smoking prevents dehydration in fish and meat and thus prevents spoilage. The wood smoke contains a large number of anti-microbial compounds that slow the rancidification of animal fats.

Canning

The food contents are sealed in an airtight container at high temperatures. Meat, fish, fruits are preserved by canning.

Sterilization

This method is carried out to remove microbes from food. For eg., milk sterilization at 100°C kills the microbes.

Dehydration

It is the process of removal of water from food. It is the simplest method and prevents food spoilage by removing water.

Lyophilization

This is the process of freezing and dehydration of the frozen product under vacuum.

Radiation

This method is also known as cold sterilization. The UV rays, X rays, gamma rays kill all the unwanted microbes present in food.